GEEL 2000 Language Schools



Primary (6), Unit (1)



First term

(2023-2024)











Name:...

Class: ....



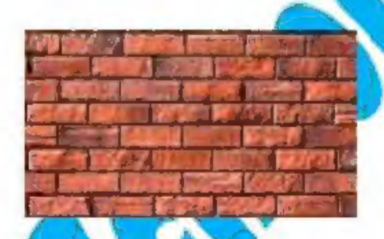


Concept (1) : The cell as a system

Lesson:1



Our building —Consists of→ walls —Consists of→ bricks



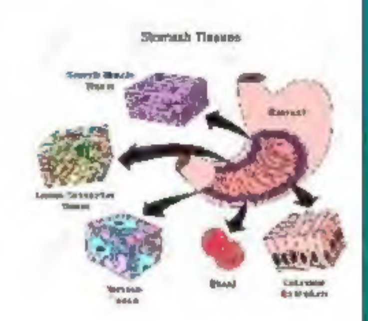
The bricks is the building unit of the building.

Our body —Consists of→ *Systems* —Consists of→ *Organs* —Consists of→ Tissues







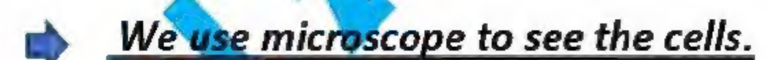


—Consists of→ Cells





The cell is the smallest building unit of our body.



We use microscope to see the cells.





They are the basic units, or building blocks of live on earth.



➡ ***Cells found only in living organisms.***

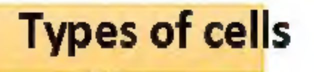
Functions of the cells:

1-Growing

2-Repairing themselves

3-Reproduce

4-Responding to environment



Types of cells

Animal cells

Plant cells





➡ ***Both of them are different in shape and size.***

Size of cells

Very small cells

(most of cells are small)

(0.005 and 0.01 mm long)

Ex: 1-plant and animal cell.

2- Bacteria

Very large cells

(some of cells are large)

Ex: unfertilized bird e




:



The unaided human eye can see objects that are about 0.01 mm long.

Organisms growth and cells

- **Living organisms grow and reproduce by increasing the number of cells.**



- ***A new cell comes from existing cells.***

Living organisms are classified according to the number of cells into:

1- Unicellular

(organisms made up of <u>only one</u> cell)

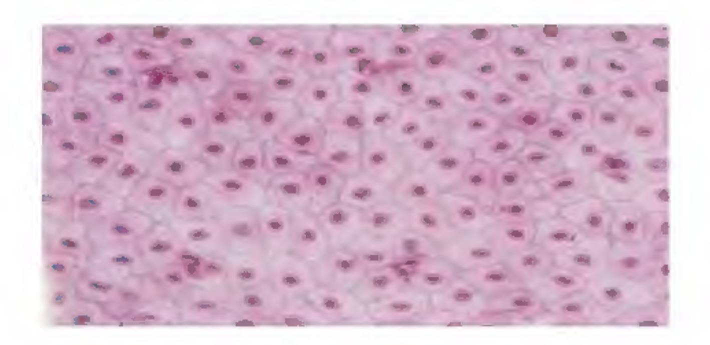
Ex: Bacteria



2- Multicellular

(organisms that have <u>more than</u> one cell)

Ex: human, animal and plant cells



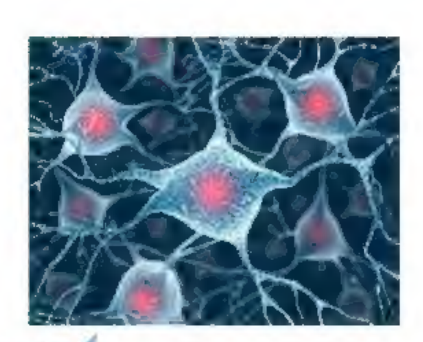
- ***Most cells are so small and cannot be seen without microscope.***

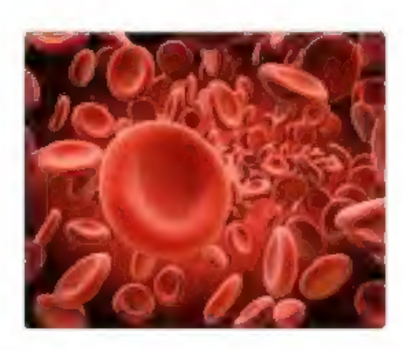


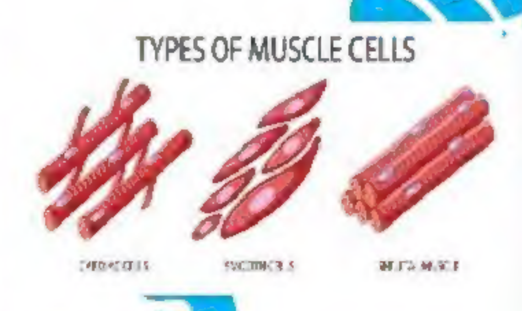


Our body contains many different kinds of cells with different functions.

1-Brain cells 2- Blood cells 3- Muscle cells







Note: **Not all cells have a nucleus such as red blood cell.**

Basic needs of the cell:

1-Oxygen and food to get energy. **2- Water.**

Note:

1- Cells have a way to take the needed materials and using them to get energy, grow and live.
2- Cells have a way of releasing waste products.

***All cells have a cell membrane (plasma membrane)**

Cell membrane:

It controls (regulates) which substance can enter or leave the cell.

Give reason:

1-The cell membrane allows water to enter the cell.

-Because water is a basic need for the cell.



2- The cell membrane allows water to leave the cell.

-To maintain the proper water balance on both sides of the cell membrane.

<u>What happen if:</u>

1-Too much water enters the cell.

-The cell will swell until it bursts.





Worksheet (1)

Questions (1): choose the correct answer:

1-The………………….is the building unit of a living organism's body

a. Brick b. cell c. organ d. blood

2-All the following are from the basic needs for the cell, except …………..

a. Water b. oxygen c. food d. carbon dioxide

3-The ……………… regulates the substances that pass in or out of the cell.

a. Nucleus b. plasma membrane c. cell wall d. cytoplasm

4- A living organism grows and reproduce by increasing the…………….of its body cell.

a. Number b. size c. volume d. length

Question (2): Give reason.

1-Bacteria are considered unicellular organism

……

2-The cell membrane is very important for the cell

……

Question 3: Write the scientific term:

1-They are living organisms, and their bodies consists of more than one Cell. (………………………….)

2-It's a device used to see very small cells as a plant cell. (……………………….)

3-They are materials released from the cell. (……………………….)

4-It's a liquid material that is necessary for the cell to do its function well (……………………….)

Question 4: what happen if:

1-Too much water enters the cell.

…………………………………………………………………………………………



LESSON (2)



❖Brief history of the cell :

- **Robert Hooke** used his microscope to examine the tiny objects which can't be seen by unaided eye like some samples of cells and described its internal parts .
- He was the first person to use the term **cell** .

❖The microscope :

1- Scientists use microscope to see tiny particles.

2- Cell is the basic structural unit of living organisms .

3- All living organisms consist of cells whatever they are small or large .

4-The nucleus of a cell was discovered because of numerous plant cells

➢ **What happens if...?**

- **The microscope wasn't invented .**
  Scientists wouldn't be able to discover the cell.

✓ ***So we can use the microscope to see***

1- The smallest unit of life "cells" .

2- Examine tiny objects which can't be seen by unaided eye .

➢ **And let's see**





➢ Experiment to examine the membrane of an onion under the microscope :-

Tools :

1- Slice of membrane of an onion.
2- Distilled water.
3- Compound microscope.
4- Eyedropper.
5- Glass slide.
6- Cover slip.

Steps :

1-Place the thin membrane of an onion in the center of a glass slide .

2-Add from 2-3 drops of distilled water.

3-carfully place the cover over the sample .

4-Examine the sample under the compound microscope .

Note : you can repeat previous steps with a slide of skin of an animal

Observation :

1- The sample of an onion consists of small units known as "cell"
2- Each cell contains many components

Conclusion :

1-cells are the smallest building units.

2-microscope allows us to see tiny objects and understand cells and they work.



1 Pull inner layer off



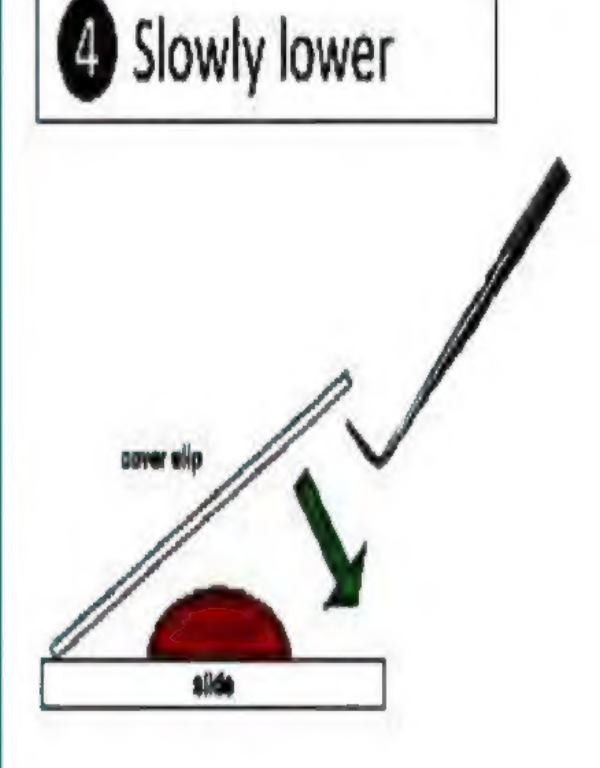
2 Place layer in centre of slide



3 Two drops on slide



4 Slowly lower



5 Observe & draw



Structure of compound microscope :

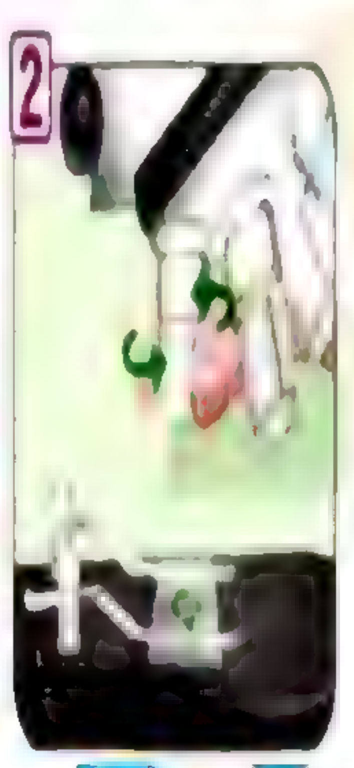
1- Eye piece
2- Nose piece
3- Objective lens
4- Stage clips
5- Stage
6- Diaphragm
7- Illuminator
8- Eye piece
9- Arm
10- Coarse focus
11- Fine focus
12- Base

1. Eyepiece Tube or Body Tube
2. Nosepiece
3. Objective Lenses
4. Stage Clips
5. Stage
6. Diaphragm
7. Illuminator
8. Eyepiece / Ocular Lens
9. Arm
10. Coarse Focus
11. Fine Focus
12. Base

Steps of using microscope :

1- Put the slide on the stage and fix it with the stage clips .
2- Choose the suitable objective lens.
3- Look at the slide through eyepiece.
4- Adjusting the coarse focus and the fine focus to see more clear image.





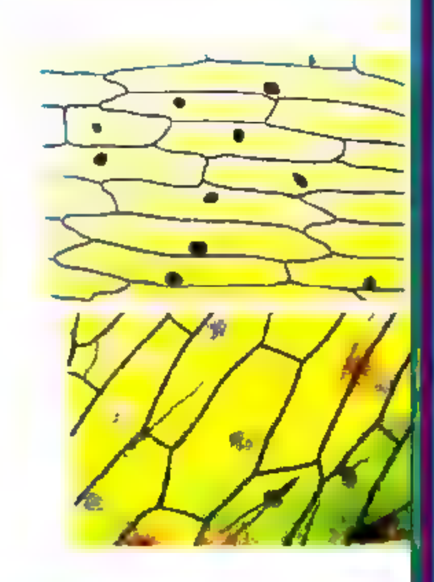




Note : you can change the magnifying power by changing the objective lens.

Observation:

When you examine the slide using the low power objective lens, you will see the cells in small size as shown in the opposite figure.



When you examine the slide using the high power objective lens, you will see the cells in bigger size as shown in the opposite figure.



Worksheet (2)



A-Choose the correct answer :

1-.......................was the first scientist to use the word "cell".

a. Newton. b. Hooke. c. Edison. d. Einstein.

2- The membrane of an onion consists of similar units called ....

a. Cells. b. nuclei. c. organs. d. system.

3- You can change the power of magnifying of a microscope by using another ....

a. objective lens. b. eyepiece. c. mirror d. arm

B-Correct the underlined words:

1-A complex living system contains <u>one cell</u>. (................................)

2-We look at the sample through the <u>objective lens</u> of the microscope. (..................................)

c-Put (✓) or (x) :

1- Developed microscopes have allowed scientists to make new discoveries. ( )

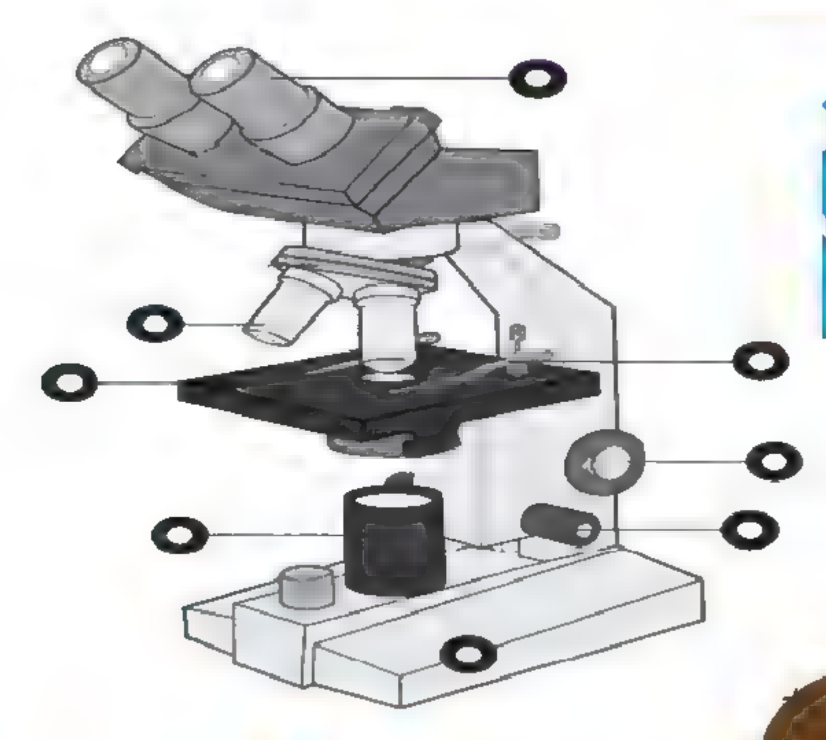
2-A leaf cell and a red blood cell can exist in the same organism. ( )

3-Sometimes a single cell exists on its own as in bacteria. ( )



D- Look at the following figure then answer :

1. Write the following labels :





2. The following diagram represents the ………………









Lesson (3)



Living organisms are classified according to the number of cells into:

Unicellular organisms	Multicellular organisms
They are organisms made up of only one cell.	They are organisms that have more than one cell.
EX. Bacteria	Ex. humans, animals and plants.





The number of cells in living organisms varies, as follow:

- A human has about 40 trillion cells.
- An animal has a variety of cell types, including:
  (Muscle cells / Bone cells / Blood cells)
- A plant has a variety of cell types that perform:
  (Photosynthesis or collect water and mineral nutrients)

Give reason:

Bacteria are unicellular.

Because their bodies consist of one cell only.

Cats are multicellular.

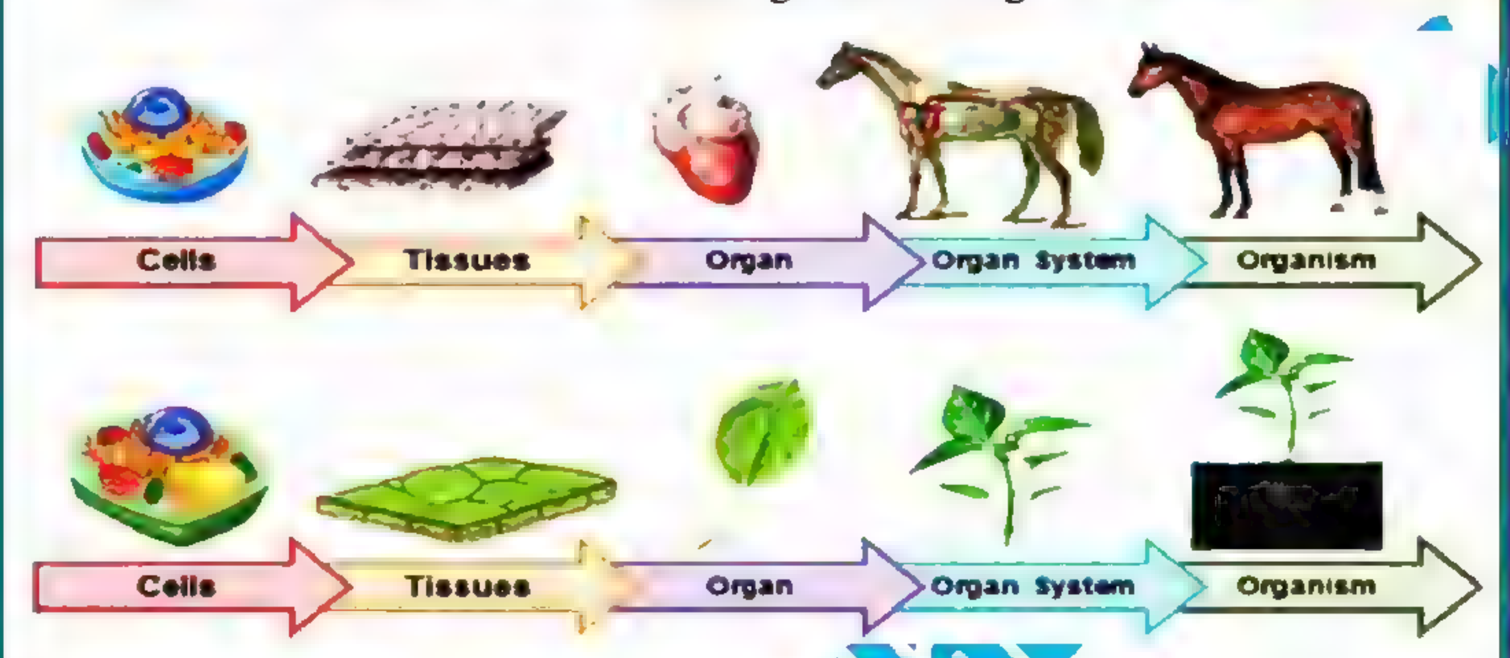
Because their bodies consist of many cells.







The structure of most multicellular organisms is organized into five levels:

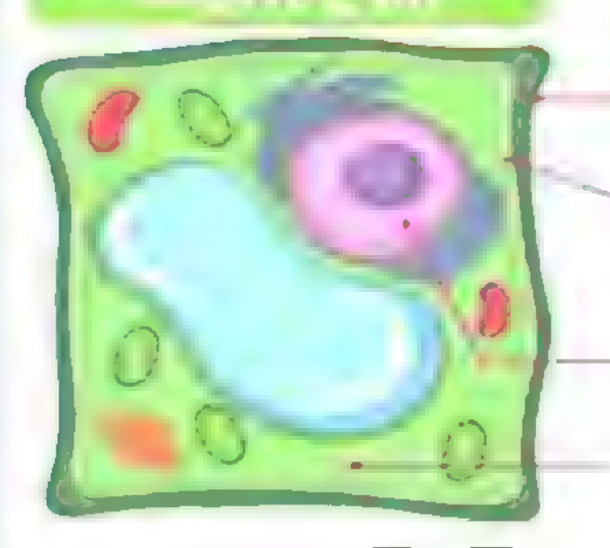


Level	Definition	Examples
1. Cell	The basic (smallest) unit of life.	Stomach cells
2. Tissue	A group of similar cells that share a common origin and perform the same function.	Stomach tissues
3. Organ	A group of tissues involved in performing a particular function.	Stomach
4. System	A group of organs that perform a specific function.	Digestive system
5. Entire organism	A group of systems that work together.	Human



➢ Structure of cell

Animal Cell







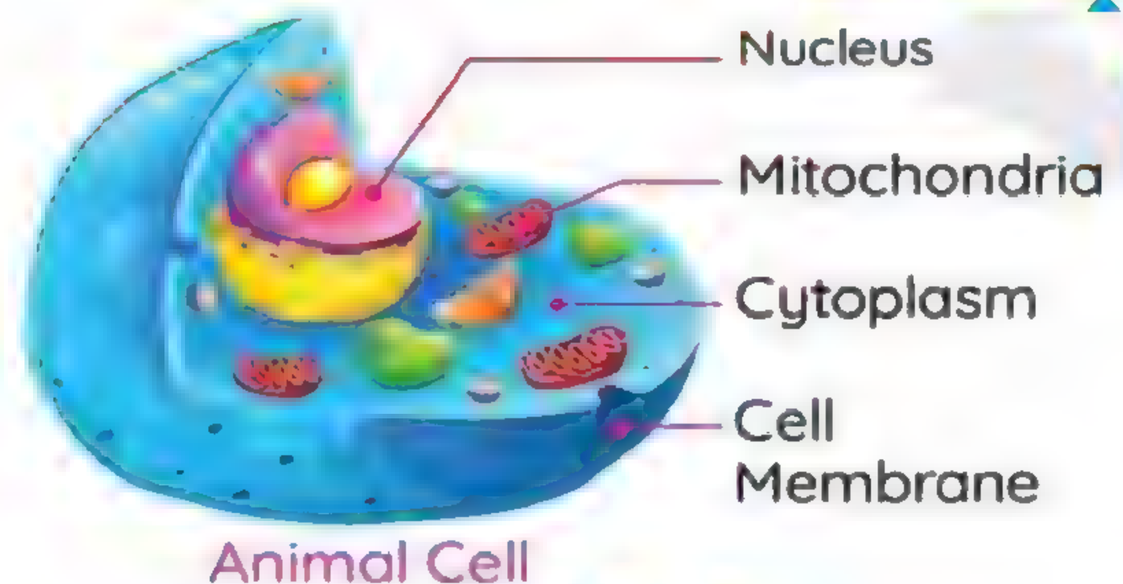
Structures inside the cell that has a special function.

Parts of the cell (organelles) and their functions:

Part	Location	Function
Cell wall (it is made from cellulose and [illegible])	It surrounds the plant cell from outside.	It gives the cell a definite shape.
Plasma (Cell) Membrane	It surrounds the plant and animal cell (cytoplasm).	It protects the cell and regulates what can enter or leave it
Nucleus	It is located at the center of the cells.	It is the control center for the organelles.
Cytoplasm	It is located inside the membrane.	It supports the organelles.
Chloroplast	Found only in plant cell.	It is not found in animal cell.



The Functions of some cell parts



- Different cells have different structures.
- The cells of multicellular organisms can vary greatly.

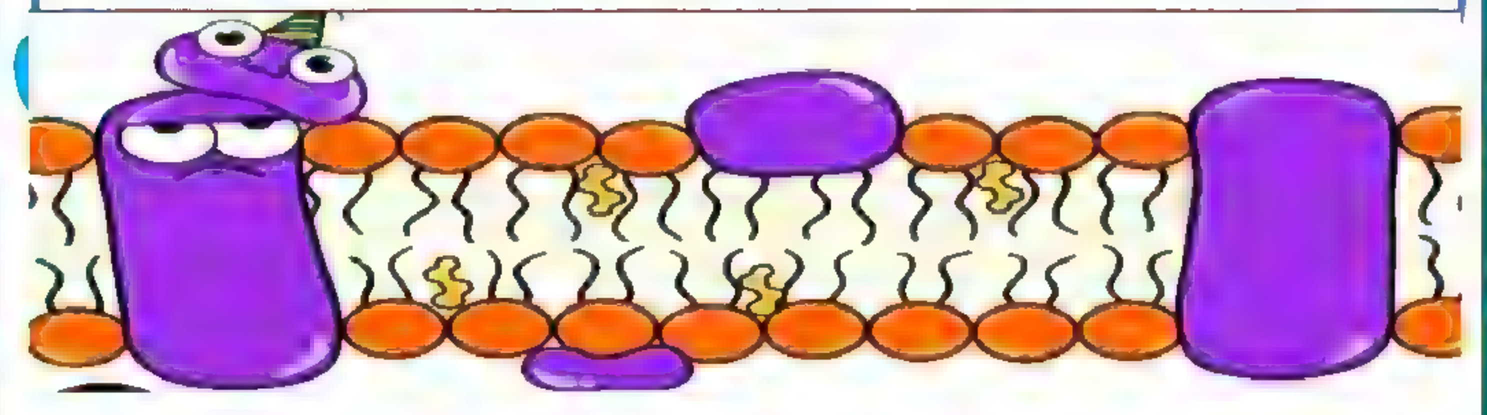
❖ **Common characteristics**

Most cells have cytoplasm, a cell membrane, a nucleus, and mitochondria.

1. Cell Membrane

- **It is the outer lining of the cell.**
- **It controls which substances can enter or leave the cell.**
- **It is said to be "selectively permeable" G.R**

Because some substances can pass through it, while others cannot.





2.Cytoplasm

- It is the **gelatinous liquid** inside the cell in which other cell parts float.

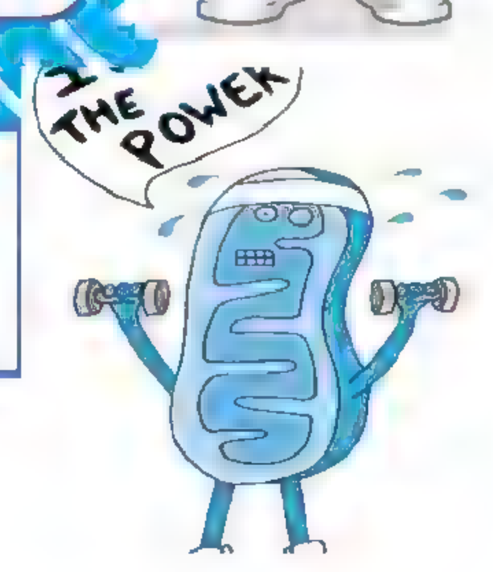
3.Nucleus

It is responsible for **controlling cell activities**, such as:

1. Making proteins
2. Cell division



4.Mitochondria



1. They are powerhouses that provide the cell with energy.
2. Cellular respiration takes place in it. (converting sugar inside the cell into sugar).

Cellular respiration:

It's a process takes place inside mitochondria by using oxygen gas to get chemical energy from food.







Worksheet (3)



Q.1: Choose the correct answer:

1-The human body is composed of ………………cells.

(40 hundred - 40 thousand - 40 million - 40 trillion)

2-All the following are from the cells found in the animal body, except the…………

(Blood cells – xylem cells – bone cells – muscle cells)

3-The tissue is a set of similar………………

(systems – cells – organs – organelles)

4-All the following are considered organs, except the…………………

(lung – heart – stomach – muscle tissue)

5-All the following organelles are common in plants and animals cells, except the…………..

(cytoplasm – cell wall – nucleus – cell membrane)

Q.2 A Study the following three figures, then answer:

1. Figure (………) consists of tissues.
2. Figure (………) represents a group of cells

a

b

Q.3 Complete the following: -

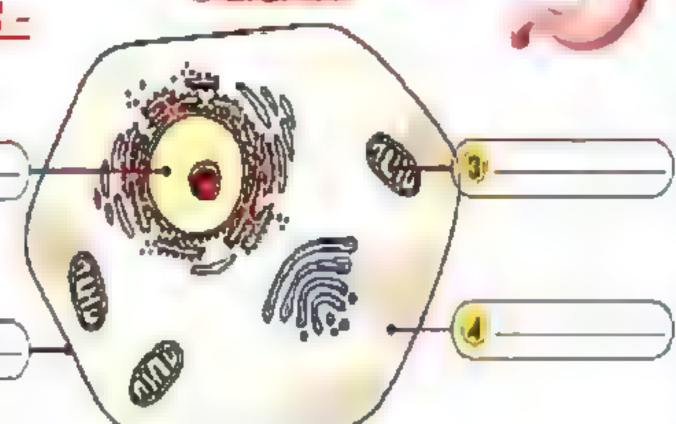
Write the following labels:

1 ……………………….

2 ……………………….

3 ……………………….

4 ……………………….



Q.4 Give reasons for:

1-The cell membrane has the selective permeability property.

………

………

2-The nucleus has an important role for the cell.

………

………

3-The mitochondria have an important role for the cell.

………

………

Q.5 What happens if:

1. The cell wall in the plant cell is absent?

………

………

2. The mitochondria are absent from an animal cell?

………

………

Q.6 Complete the following sentences using the words between the brackets:

(cells - similar - nucleus - organelles - tissues)

1-A cell consists of …………that are functioning in …………ways to maintain the cell.

2-An organ is composed of a set of ………………that are composed of a group of ……………

3-The …………in the cell is responsible for cell division.



Q.7 Correct the underlined words:

1.A system is composed of a set of <u>tissues</u> that work together.

(…………………………….)

2.The liver consists of a group of <u>organelles</u> . (…………………………….)

3.The <u>cytoplasm</u> is the control center of the cell . (…………………………….)

4.The <u>cell wall</u> is a semi-permeable membrane that controls the substances entering the cell. (…………………………….)

5.<u>Photosynthesis</u> process takes place inside the mitochondria.

(…………………………….)

6.The <u>plant</u> cell is the building unit of the human body.

(…………………………….)

Q.8 Cross out the odd word:

1. Digestive system - Respiratory system - Circulatory system – Heart

(…………………………………)

2. Blood cell - Stomach - Lung - Liver

(…………………………………)

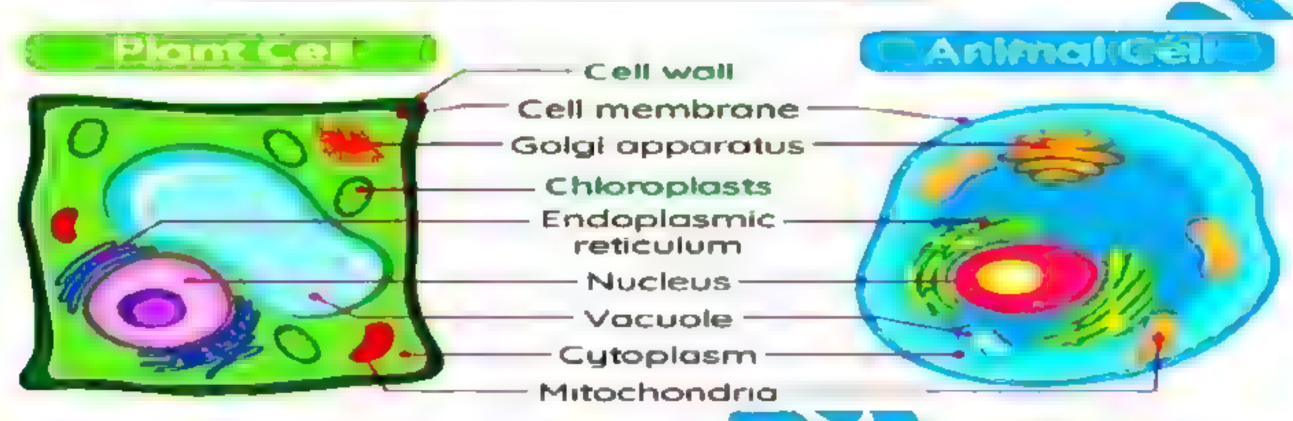




Lesson (4) and (5)



Comparing plant and animal cells



P . O . C	Animal cells	Plant cells
Differences	• They **don't** have a cell wall or chloroplast	• They **have** a cell wall and a chloroplast .
Similarities	• **Both of them have common organelles , such as :** 1-cell membrane 2-Cytoplasm 3-Nucleus 4-Mitochendria 5-Endoplasmic reticulum 6-Golgi apparatus 7-Vacuola	

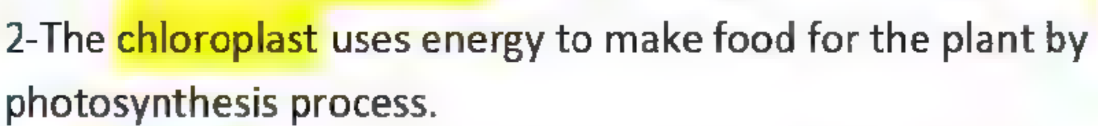
- Differences between plants and animals cells

1-Plant cell

1-Chloroplast	
 Pigments of chlorophyll	• It is a tiny structure that is found in **plant's cell only.** • It contains **chlorophyll** and carries out the **photosynthesis process**. ❖ **These grains are green ? (give reason)** -Because they contain the pigment of chlorophyll



How does the plant make its own food ?



1-The pigment chlorophyll absorbs energy from sunlight

2-The chloroplast uses energy to make food for the plant by photosynthesis process.



2-Cell Wall	• It is found in the <u>**plant's cell only**</u> . • It's the <u>**rigid outside**</u> material that surrounds the plant cells . • It gives them a <u>**definite shape**</u> .

✓ **Give reason :**

- **only the rigid structures found in the plants.**

-Because they don't have cell walls.

Note:

- **Animals have other ways of keeping their shape .**

  1-Some animals have bones .

  2-Insects have <u>**an exoskeleton**</u> (a hard , shell-like covering)

❖ **Both plant and animal cells have Common cell organelles** to <u>Control , organize and maintain the cell</u>

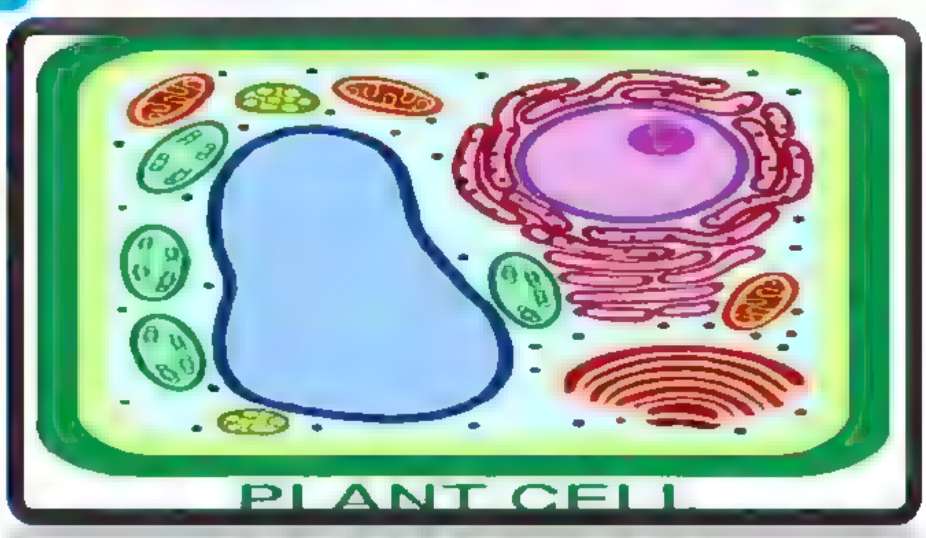
-These functions are mainly done by the
cell membrane , cytoplasm , cell nucleus , mitochondria , endoplasmic reticulum , Golgi apparatus and Vacuole.



Organelle	Function
1-Cell membrane	• It is the surrounding layer of the cell . • It controls what materials enter and leave the cell.
2-Cytoplasm	• it is the gelatinous liquid inside the cells in which other cell parts float .
3-Cell Nucleus	• it controls the functions inside the cell such as : 1-Making proteins . 2-Cell division
4- Endoplasmic Reticulum	• It helps in assembling and transporting proteins
5- Golgi Apparatus	• It helps package nutrients within vital products inside the cell • It helps transport nutrients outside the cell
6- Vacuole	• They are saclike structure used for the storage of nutrients , water and waste • In plant cells , large vacuole contain water.
7-Mitochondria	• It converts sugar into energy for the cell .

❖ **The vacuole is larger in the plant cell than in the animal cell ? (Give reason)**

-Because the plant stores a large amount of water in the vacuole.



Points of comparison	Plant cell	Animal cell
Definition :	It is the main building unit of plant's body.	It is the main building unit of animal's body.
Cell membrane :	Present	Present
Cytoplasm :	Present	Present
Nucleus :	Present	Present
Mitochondria :	Present	Present
Golgi apparatus :	Present	Present
Endoplasmic reticulum :	Present	Present
Vacuole :	One big sap vacuole	Many small vacuoles
Chloroplasts :	Present	Absent
Cell wall :	Present	Absent





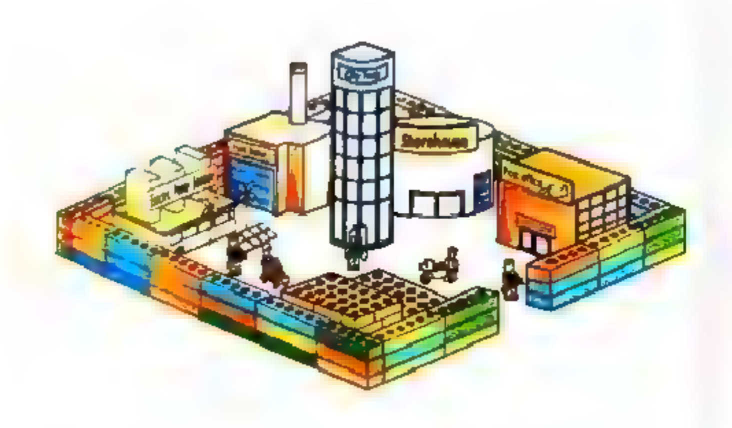


Project : Planning a cell city .

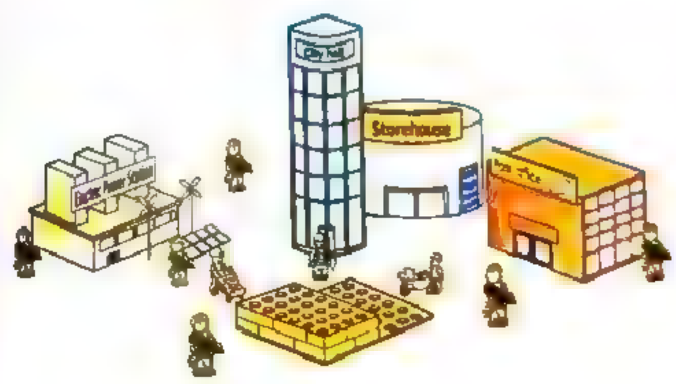
- Cell structure look like city structure .

Cell structure	City model
1-Cell wall (plants only):	A power brick
2-Cell membrane:	Guards at the city
3-Nucleus :	City hall
4-Endoplasmic reticulum :	Construction workers
5-Mitochondria :	Electric power station
6-Chloroplast (Plant only) :	Food factory
7-Vacuole :	Storage facility
8-Golgi apparatus :	Packaging factory or post office

- Compare between the two models :



Plant cell city



Animal cell city

Note

There are two structures in plant cell that are **not found** in the animal cell , which are :

1-**The stone wall** surrounding the city (that represents **the cell wall**)

2-**The food factory** (That represents the **Chloroplast**





Worksheet (4) and (5)



Q. 1) Choose the correct answer :

1-Which of the following is found in both plant and animal cells ?...............

a-Cell membrane b-Cell wall

c-Large, water filled vacuole d-Chloroplast

2-The ....release(s) energy to power the cell

a-mitochondria b-cell wall

c-nucleus d-cell membrane

3-..........................are unique structures that exist only in the plant cell.

a-Mitochondria b-Nuclei

c-Vacuoles d-Chloroplasts

Q.2)Write the scientific term :

1-They are saclike organelles that store nutrients , water and waste .

(......................................)

2-It's a process that occurs inside the chloroplast

(......................................)

3-It's a process that occurs inside the mitochondria .

(......................................)

4-It's the fluid found in the cell that holds its organelles

.(.................................)

Q.3)Correct the underlined words :

1-Insects have a hard ,shell-like support called **an endoskeleton** .

(...................................)

2-The endoplasmic reticulum helps in the assembly and transport of **fats** in the cell .

(...................................)



Q.4) Give reason :

1-Animals can't make their own food ?

……

……

Q.5) What happen if :

1-The endoplasmic reticulum is absent from the cell ?

……

……

Q.6) 1-The following diagrams represent the

……………………… and ………………

2-Write the following labels :

a-……………………

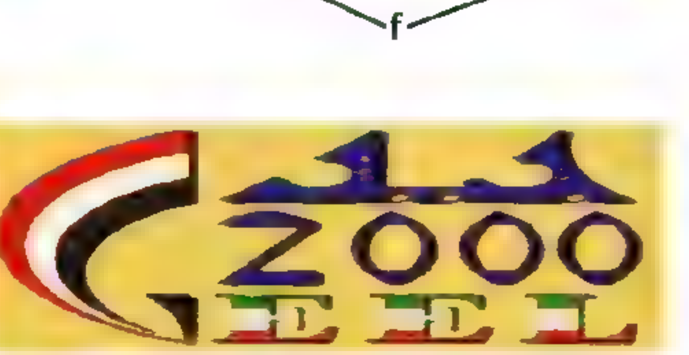
b-……………………

c-……………………

d-……………………

e-……………………

f ……………………





Lesson (6)



STEM (in Action)

Cell biologists	• Are scientists who **study cells** and use microscopes to magnify cells so they seem larger .
Cells	• Are very tiny , where the diameter of animal cell is about (0.001 cm)

Cell biologists work in laboratories and do experiments to study

1. How cells work inside the living organisms
2. How cells respond to different variables

- Cell biologists analyze data and present their conclusions to other researchers .

✓ **Give reason :**

1-Some cell biologists work with doctors ?

To watch how cells can work to repair body parts

or how cells respond to different medicines.

2-Some other cell biologists work in agriculture ?

To study how plant cells respond to different environmental factors



Staining cells

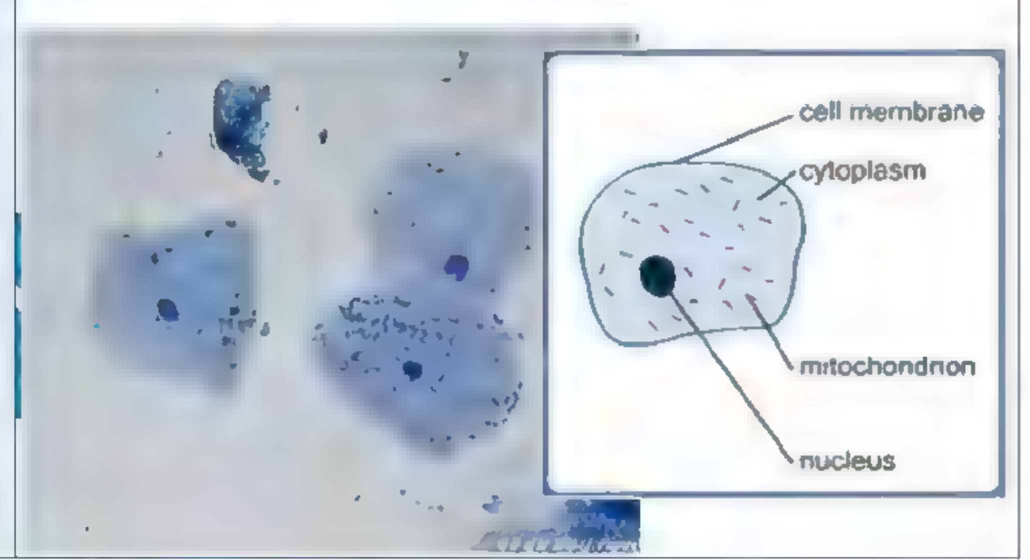
Note :

- Cells are usually **clear** and **colorless** , so it is hard to see their structure under microscope .

Stains	• Are used to add color and make the cell's structures more visible .

- There are different types of stains .
- Some stains are used to highlight one part of cells and make it more visible such as "**methylene blue**"

Methylene blue	• A stain that is used to **color the nucleus** as a blue area Such as sample of cheek lined membrane cells



✓ **Give reason :**

We must stain (dye) cells before examining them under microscope ?

Because cells are usually clear and colorless , so it hard to see their structures under microscope.

3D microscope	It is a device that allows scientists to see the top , sides and layers of a cell 

- **How does a 3D microscope work ?**
  1-It takes pictures of a cell in layers .
  2-Then , a computer puts these layer together .
  3-Finally , colors are added to formed image .



The three D microscope can help:

Cell biologists	Doctors
To learn more about **cell components** and how **cell divide**	To **treat cancer** which is caused by cells that divide too quickly





Worksheet (6)



Q.1) Choose the correct answer :

1-To see the structure of a cell under microscope we must color it by using ……….

a-stains b-water c-sunlight d-vinegar

2-Methylene blue dye helps us to see the …………….of the cell as a blue area under microscope .

a-cytoplasm b-Golgi apparatus c-chloroplasts d-nucleus

Q.2)Put (√) or (×) :

1-Cell biologists are scientists who study rocks . ( )

2-Cells are usually clear and colorless , so it is easy to see their structures under microscope . ( )

Q.3)Complete The following sentences :

1-To see the nucleus of a cell under microscope , we can stain the cell with ……………………………

2-The 3D microscope can help ……………… learn more about how cells divide .

Q.4)Give reason :-

1-Some cell biologists work with doctors ?

…………………………………………………………………………………………

…………………………………………………………………………………………

…………………………………………………………………………………………

Q.6) Write the scientific term :-

1-They are scientists who study cells .

(……………………….)

2-The microscope that helps us to see the top , sides and layers of the cell .

(……………………….)



Concept (2) Lesson (1)



***All body systems interact and work together in an integrated way.**

Examples:-

1- Interaction between the nervous system and circulatory system as when you feel nervous, your heartbeats increase

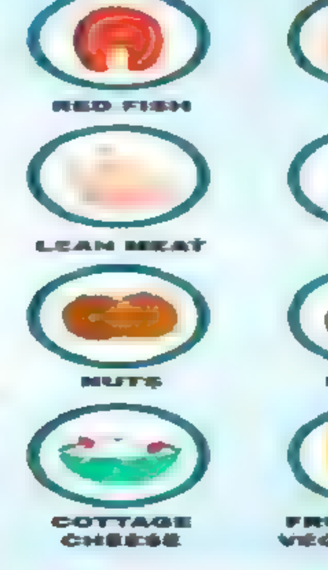


2-Interaction between digestive system and skeletal system

The digestive system provides the skeletal system with nutrients needed for growth **and** fracture healing.

BEST FOODS
FOR MUSCLE GROWTH



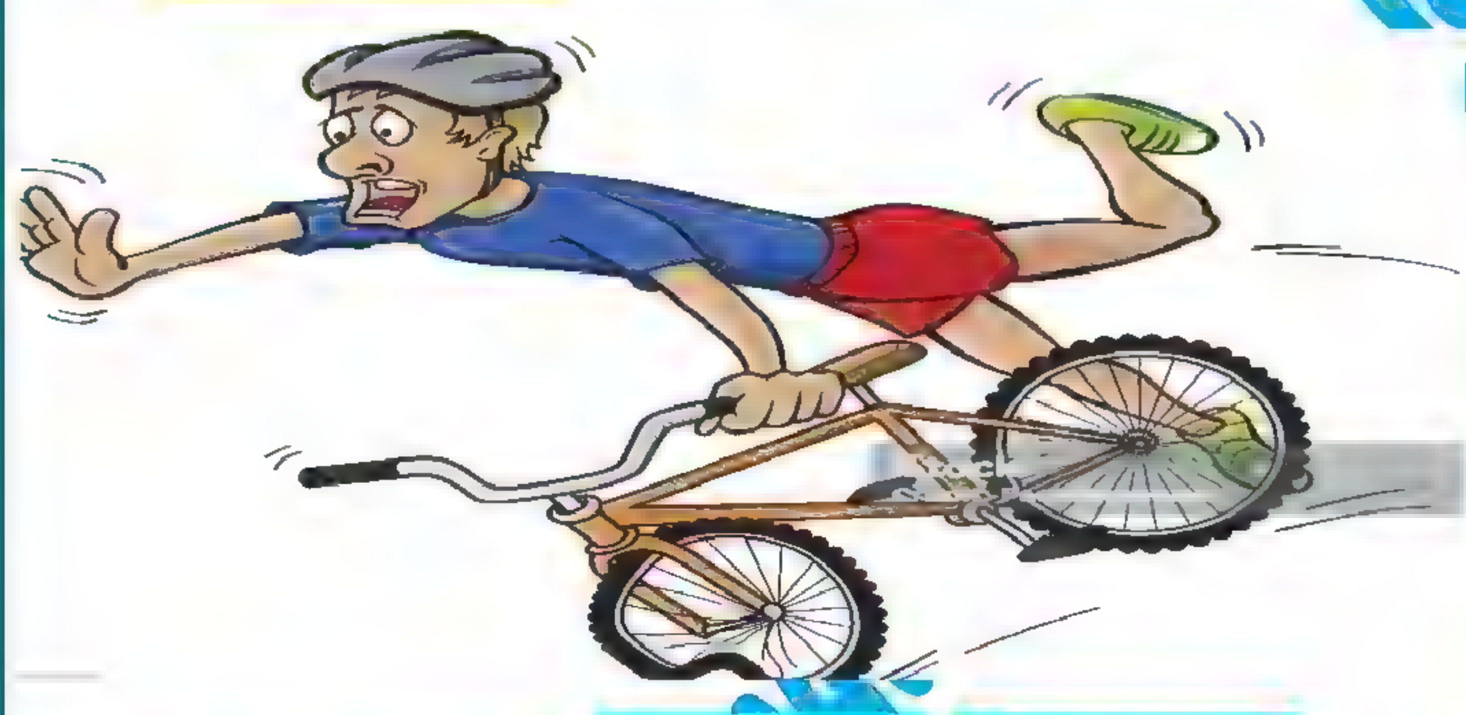


3-Interaction between circulatory system and muscular system are important in dangerous situation as

(cyclist in a dangerous situation)

*All body systems work together to produce physical response such as increase in heartbeats.

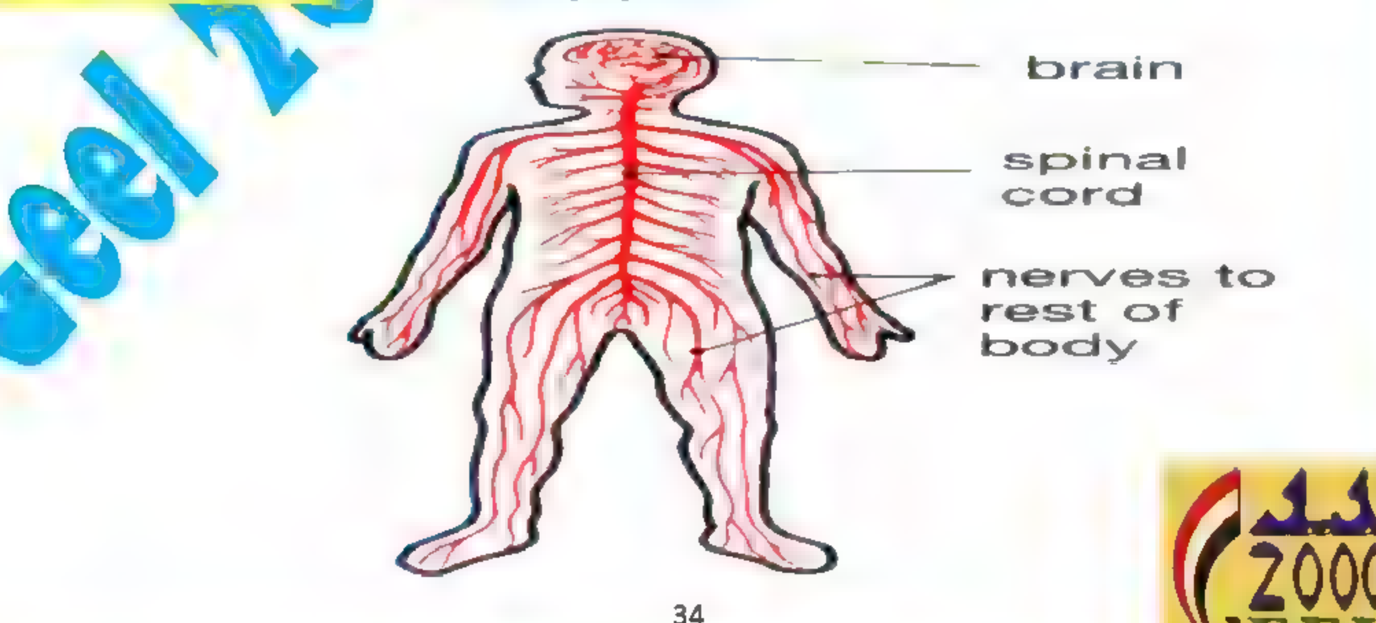
*The brain receives information from the eyes. Then the brain sends a signal to the muscles that contract and allow his body to face the danger



4-The interaction between nervous system, digestive system and circulatory system.

The digestive system dig[illegible] food [illegible] nutrients are transmitted to the nerve cells to perform their f[illegible] [illegible]rough blood in the circulatory system.

The nervous syste[illegible] the muscles of stomach in the digestive system and the muscles of heart in [illegible]e circulatory system.






Worksheet (1)

1-Complete the following sentences

1-skeletal system takes nutrients from …………… system for growth of muscles.

2-when you touch a hot cup of tea, …………system sends message to the muscle of your hand to contract.

3-The nerve cells depend on ……….system, and ……….system to get their needed nutrients.

4-muscles of stomach and muscles of heart can be controlled by…………system.

5-In a dangerous situation, your eyes send information to the ………… to perform the suitable action.

2-Put (√) or (×):

1-All body systems in your body work together in an integrated way. ( )

2-Digestive system can digest food without the help of nervous system. ( )

3-muscles of heart are controlled by nervous system. ( )

4-Digestive system transfers oxygen gas to all muscles in your body ( )

3-What happen to……?

The brain of cyclist when he sees a dangerous situation.

……………………………………………………………………………………

……………………………………………………………………………………

……………………………………………………………………………………

4-Give reasons for:-

1-Digestive system helps skeletal system in fracture healing.

....

....

....

2-The nerve cells in the nervous system need nutrients.

....

....

....

3-The importance of nervous system to the muscles of the heart.

....

....

....

Lesson (2)



How are cells organized to build the human body body?

1-From cells to tissue:-

Example :- muscle cells are:

*long fibers to allow movement.

*must be able to store and use energy quickly.

*Don't work alone because the size of muscle cell is very small and must work with thousands of other cells to be effective.

*They are bundled (collected) together to form tissue.

Give reason:

There are many shapes and sizes of cells.

Because cells must be specialized to perform specific function.





2-From tissues to organs

*Bundles of tissues are organized to form the muscle.

*The muscle is considered an **organ.**

*An organ is a part of an organism that has specific function .

Examples:

The muscle that lies on the front part of upper arm between the elbow and the shoulder.

3-From organs to systems

***Each system** is group of organs that perform specific function for the body.**

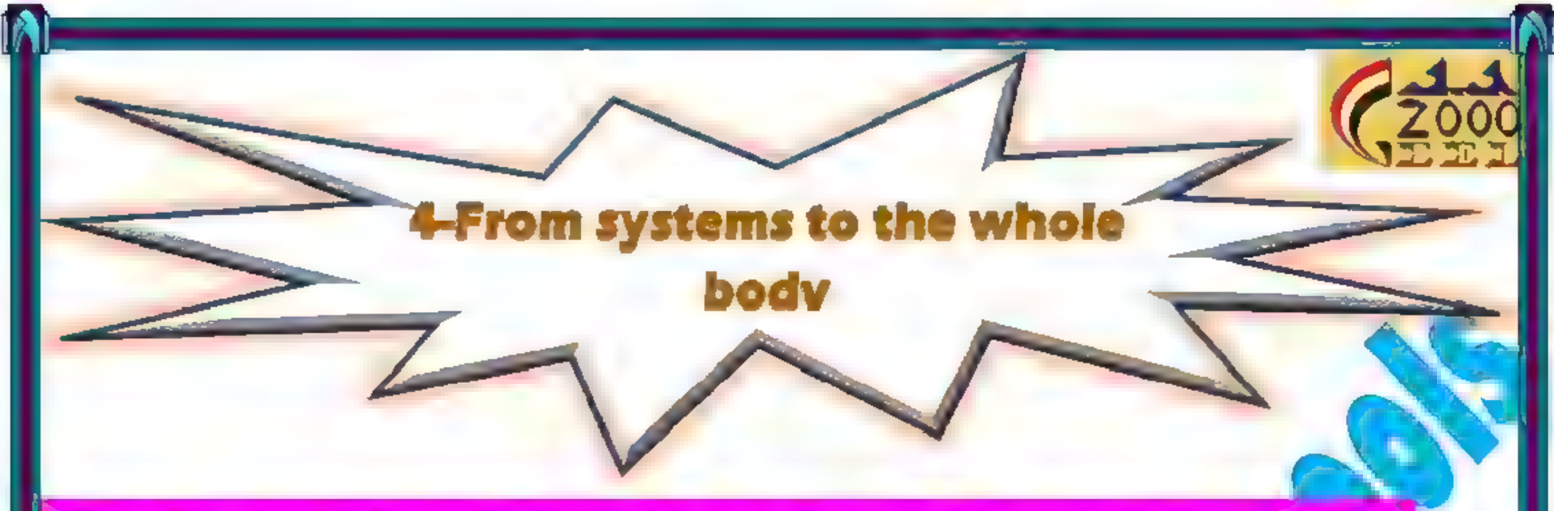
Example:- musculoskeletal system

***It consists of muscular system and skeletal system that work together to allow the body movement.**

***It consists of group of organs which are**

*Bones * muscles * ligaments

*Tendon *cartilage



Tasks require different systems to work together.

Example:- Playing football

It requires interaction between the respiratory system , circulatory system, nervous system, muscloskeletal system and excretory system.

Example for interaction between the skeletal and muscular system

Moving muscles

Your arm moves due to contraction and relaxation of muscles connected to the bones of the arm

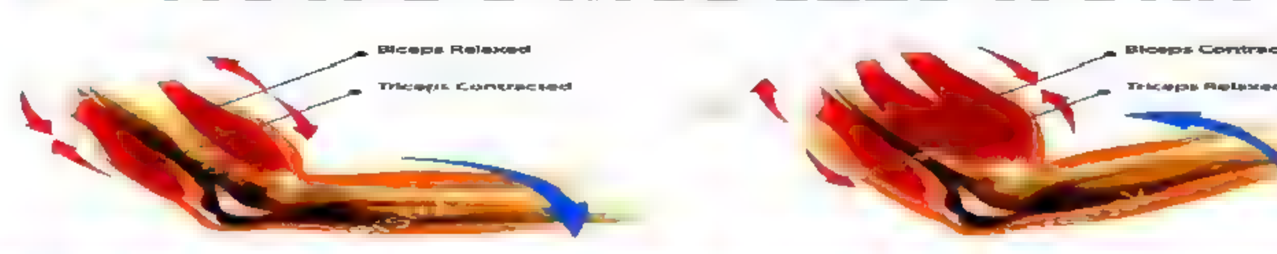
*The forearm moves up:

When the muscle in front of the upper arm contracts and the muscle in the back of the upper arm relaxes.

*The forearm moves down: When the muscle in front of the upper arm relaxes and the muscle in the back of the upper arm contracts

Note :the contraction of muscles moves the bones in one direction.

HOW DO MUSCLES WORK





Worksheet (2)

1-Put (√) or (×):-

1-Muscle cells cannot store energy and use energy quickly ( )

2- The muscle is formed from bundles of muscle tissues ( )

3- The body can move by the help of the skeletal system only ( )

4- A group of different tissues can form a system.

5-Contraction and relaxation of leg muscles allow the bones of le

2-Write the scientific term of each of the following:-

1-They are cells in the form of long fibers to allow m

(.......................)

2-It is the organ which contracts and relaxe n the movement of the body.

(.......................)

3-The system which helps the body

(.......................)

4-They are muscles that att hed to bones of skeletal system.

(.......................)

3-Give reason for:

1-muscle cells in form of long fibers.

....

2-Muscle ls don t work alone.

....

3- system cannot do the function of movement without muscular system.

....



Lesson (3)



Types of muscles:

Involuntary	Voluntary
They are muscles that move automatically. You can't control their movement.	They are muscles that you can control their movement.
Ex: 1-Eye muscle. 2-Cardiac muscles	Ex : 1-Abdomen muscles. 2- skeletal muscles like: - **Upper arm muscle.** - **Neck muscle.** **-forearm muscle.**



-**Heart** is made up of type of involuntary muscles known as **Cardiac muscle** it contracts and relaxes.





Why?

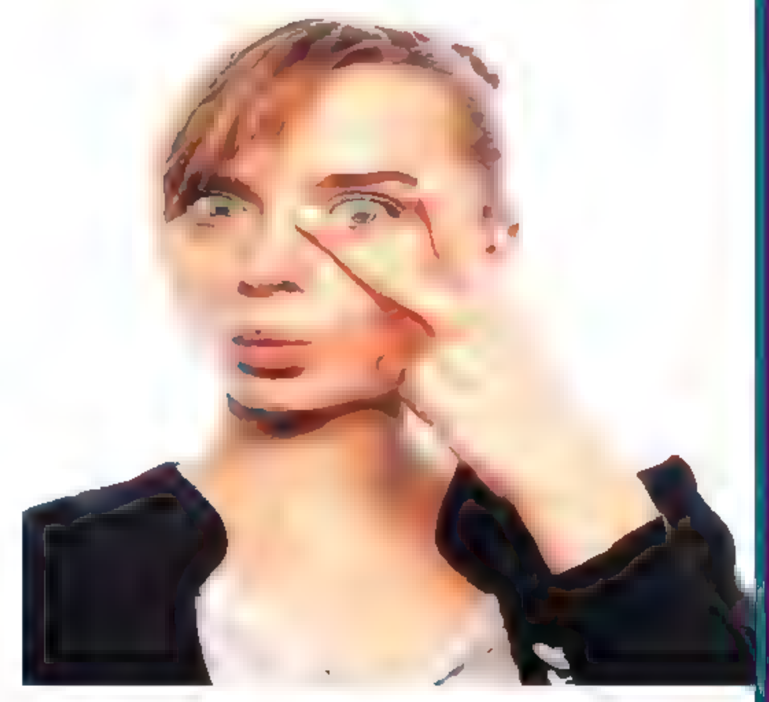
To allow the heart pumps oxygenated blood to all body cells.

The Eye

-**Eye** contais **involuntary muscles** that contract when you close your eyelid to allow you blink without thinking.

- Do you know?

Your eyes also contain **voluntary muscles** that surround the eyeball **to help you move your eyes in different directions.**





Abdomen muscles:



There are two abdomen voluntary muscles on each side of your body known as waist muscles.
When you twist your waist to one side, the two muscles on that side contract together, while the two muscles on the other side relax.

Skeletal muscles

1- Upper arm muscles :

-When you bend your elbow ,the muscle in front of your upper arm contracts and the muscle in the back relaxes.



-When you straighten your elbow , the muscle **in front of** your upper arm **relaxes** and the muscle **in the back contracts**.

2- Neck muscles:

There are **two** neck voluntary muscles.



- By moving head up, one of these muscles contracts.



-By moving head down, the other muscle contracts.



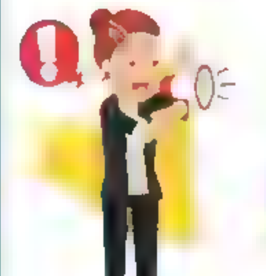
3-Forearm muscles:

There are **two** forearm voluntary muscles.

- **By turning your hand over (your palm up), one of these muscles contracts.**
- **By turning your hand down (your palm down) the other muscle contracts.**



- **All muscles work by contraction.**
- **When a pair of skeletal muscles perform an action, one muscle contracts and the other relaxes.**



Endocrine system



-It consists of **glands** that secrete → **hormones** **to fight the danger or run away.**

-It controls the body temperature and blood pressure.

-**When you face a danger and your eyes see it and send signal to the brain, the brain sends a signal to the body to respond to that danger such as: increasing the heartbeats, increasing breathing rate and contraction of muscles.**



CIRCULATORY SYSTEM

- It consists of **Heart** and **blood vessels** (veins, arteries and blood capillaries)

- It transports **blood, gasses, nutrients** and **hormones** throughout the body.



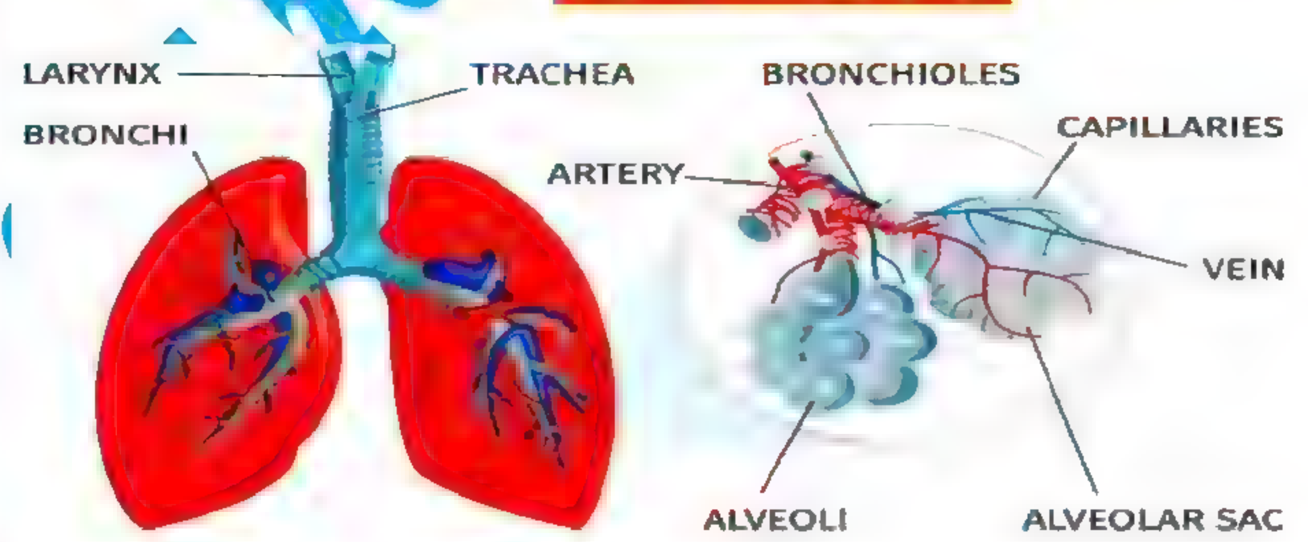
- **During danger:**



The heart beats quickly, Heartbeats increase causing:

1- Pump more blood to the muscle, the heart and other organs.
2- Increasing the blood pressure.

Respiratory system

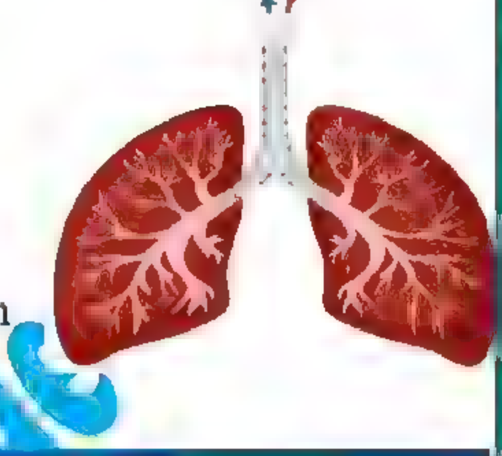






-It consists of: lungs, diaphragm and airways (like trachea and bronchi)

- It provides the body with oxygen gas and gets rid of carbon dioxide gas.

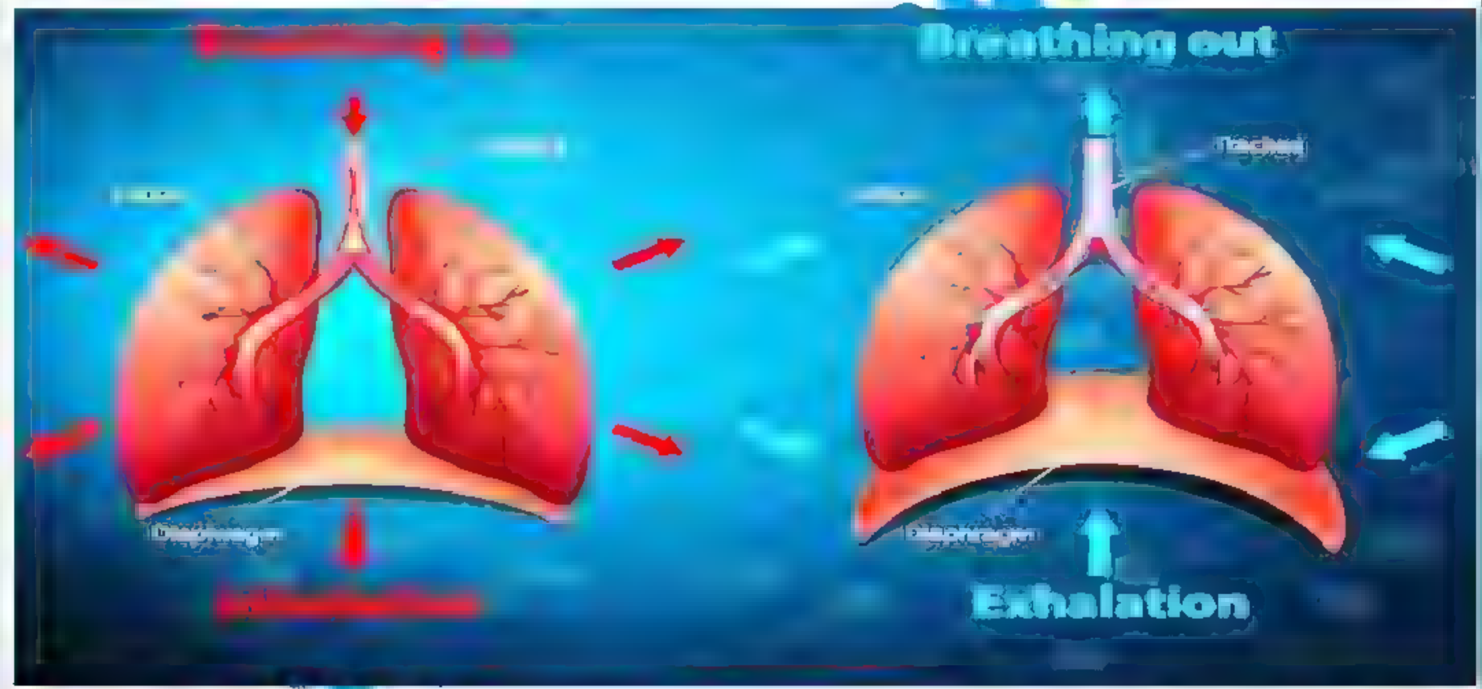


-During inhalation:

Diaphragm muscle contracts and lungs take air rich in oxygen.

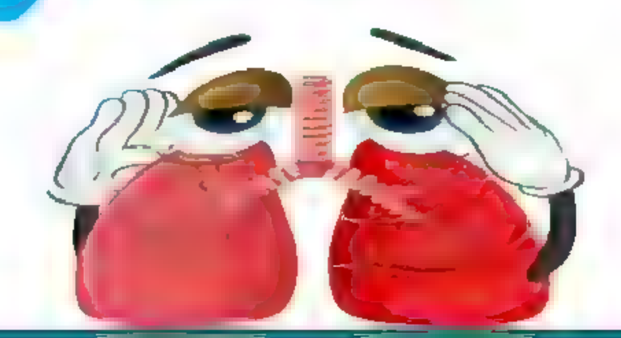
During exhalation:

Diaphragm muscle relaxes and lungs release the air rich in carbon dioxide.



During danger:

The breathing rate increases and the heartbeats increase to allow body to send more oxygenated blood to the muscles and brain





Worksheet (3)



Q.1) Complete the following :

1- All muscles can do their function of movement by ……………

2- The muscles of heart are called …………muscles and they are considered as a type of ……………….muscles.

3-Endocrine system consists of …………which secrete………that control blood …………….

4- In dangerous situations, heart pumps more blood which carries …………….,……………and ……………..to the muscles and other organs.

5-Among the skeletal muscles that you can control their movement are upper arm muscles ,……………… and……………….

Q.2) Write the scientific term:

1- It is the system that consists of lungs and other airways. (………..……….)

2- They are muscles that move automatically and cannot control their movement (………………….)

3- The system that secrete hormones to control the body temperature and blood pressure. (…………………)

4- A type of involuntary muscles which form the heart that contact and relax all the time without stopping. (. ……………………)

5-They are muscles that allow the movement of the bones of skeletal system. (…..…………………)

Q.3) Give reason:

1- Cardiac muscles are considered as involuntary muscles.

…………………………………………………………………………………………

…………………………………………………………………………………………



2-When the body faces a danger, the heartbeats increase.

…………………………………………………………………………………………………

…………………………………………………………………………………………………

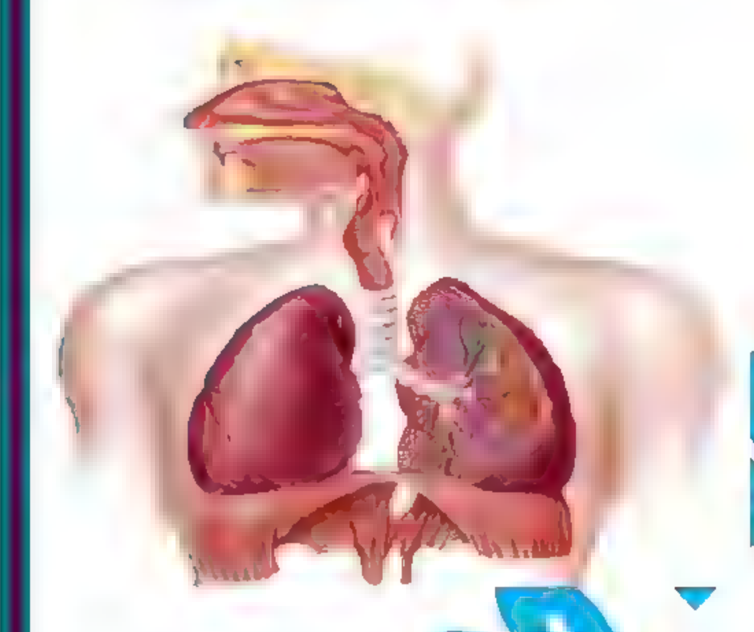
Q.4) What happens to:

1- The lungs when the diaphragm muscle contracts.

…………………………………………………………………………………………………

…………………………………………………………………………………………………

Q.5) The following figures show some human body systems, if a person is subjected to an accident while he is riding a bicycle, complete the sentences below:



System (1)



System (2)

1- System no.…………help endocrine system in carrying hormones to the muscle and the brain of the person.

2- Heart that belongs to system no. ………………begins to beat quickly .

3- System no……..contains diaphragm muscle which contracts and relaxes many times to increase the breathing rate.

4- Both system no. (1)and (2) help ………………gas to reach muscles and brain of the person.

Lesson (4) and (5)

All body systems need **food** to **get energy** and to **do their functions**.





-Food contains:
carbohydrates, fats and proteins.

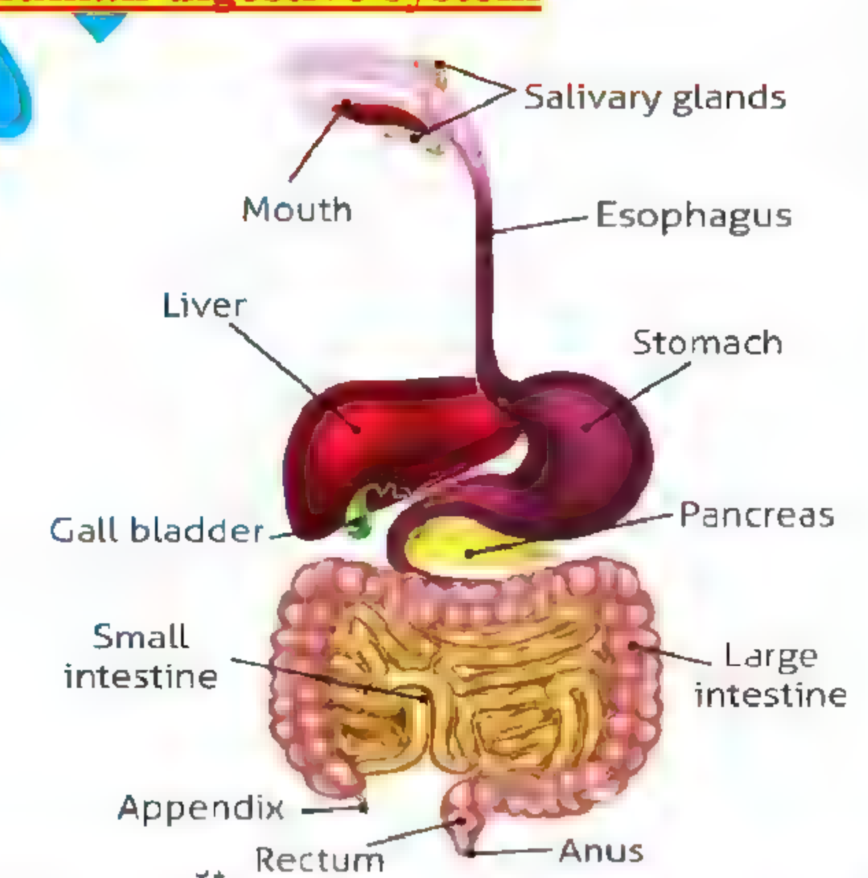
-Digestion process:

It is the process by which the digestive system converts the complex food into simpler substances that the body can use for energy and growth.

Note:

-These simple substances can be used by body cells.
-Inside cells, some of simpler substances are used in **cellular respiration** process.

The human digestive system

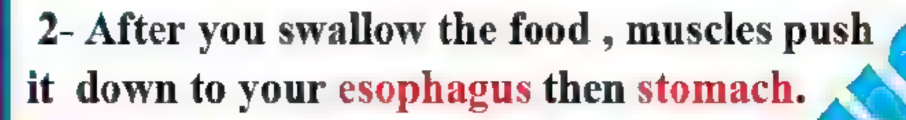




Digestion process



- 1- Digestion begins in the Mouth.
- Jaw muscle move to help your teeth to chew the food.
- Chewing breaks up the food into smaller parts to help (enzymes) chemical secreted by endocrine system.
- **Saliva :** liquid in your mouth contains enzyme which helps in digestion process and moistens the food.



2- After you swallow the food , muscles push it down to your esophagus then stomach.

Stomach secretes stomach's digestive fluids that contain an acid and some enzymes.

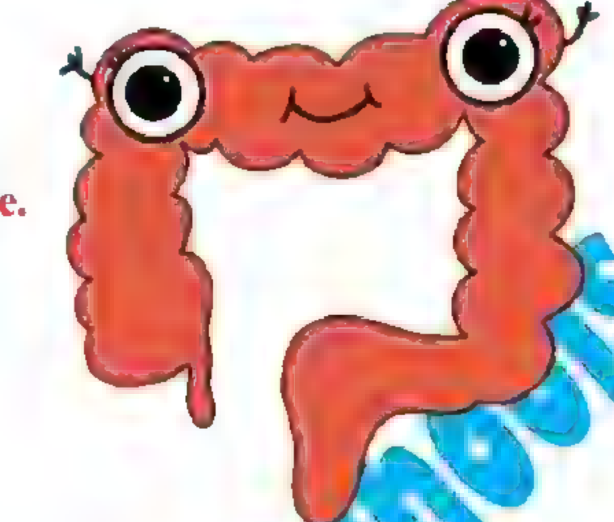
Stomach makes continuous churning movement .

Because of the movement of stomach and stomach's digestive fluids the food breakdown.

3-Once the food moves into the **small intestine** Pancreas and gallbladder secrete enzyme that help in the chemical breakdown of food.

-The absorption of nutrients (digested food) starts in the small intestine through blood vessels in the walls of it to carry them to all the body parts.





5-The undigested food is passed to the large intestine (colon)as a soupy mixture.

- **The large intestine** absorbs most of water from the undigested food then it leaves the body as **a solid mass (feces or stool).**

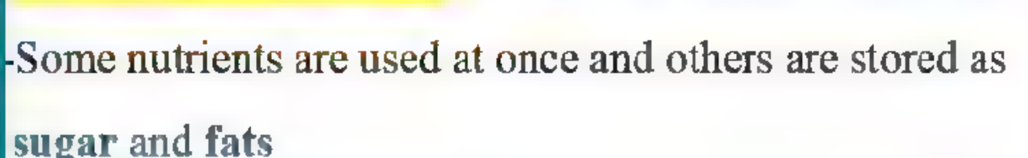
- **Rectum** : it is the last part of large intestine and stores stool until it leaves the body.
- At the end of rectum there is **an anus** (muscular opening) through it the feces leave the body.



Large intestine "colon"

Transporting nutrients

-The circulatory system transports the nutrients to different organs.



-Some nutrients are used at once and others are stored as sugar and fats

Example :

-**Liver and muscles** store **glucose sugar** → **convert it into glycogen.**

-**Liver and muscles convert glycogen into glucose sugar again and release it when the body needs energy.**

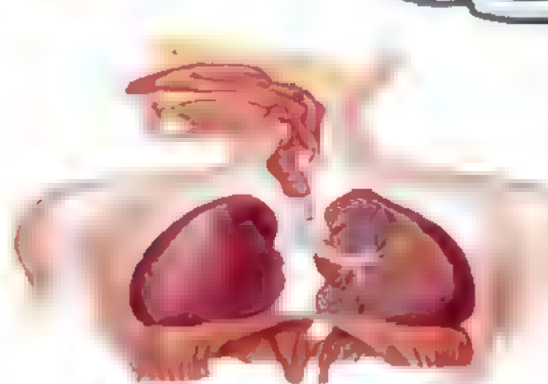
Execration process: process by which the **waste materials** leave the body.

Excretory system: It is a system that responsible for **storing and getting rid of waste materials** produced from cells.

-There are 3 parts responsible for excretion process:

1- The skin → **Sweat causes that the waste leaves the body through pores in the skin.**

2-Respiratory system → **Carbon dioxide leaves your body during exhalation.**



3- **Urinary system** ⟶ **removes the waste materials from the blood in form of urine.**

Urinary system

Aorta

Inferior Vena Cava

Right Kidney

Left Kidney

Ureter

Bladder

Urethra

Urinary system consists of:

1- Two kidneys **2-ureters** **3- bladder** **4- urethra**

Kidney ⟶ **clean and filter the blood up to 300 times a day , sometimes called filtering system of blood.**





How does it occur?

1-A large artery brings blood to each kidney.

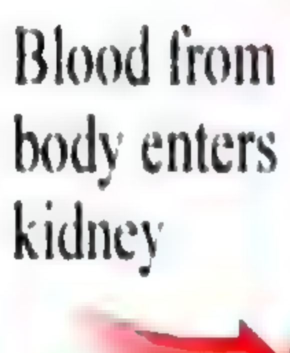
2-Each kidney contains large no. of microscopic filter known as (nephron) that filter the blood.

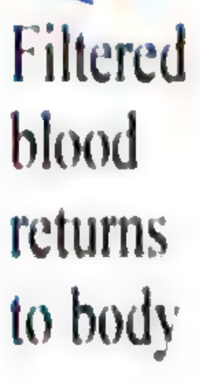
3-Due to the breakdown of proteins inside the cells body urea is formed.

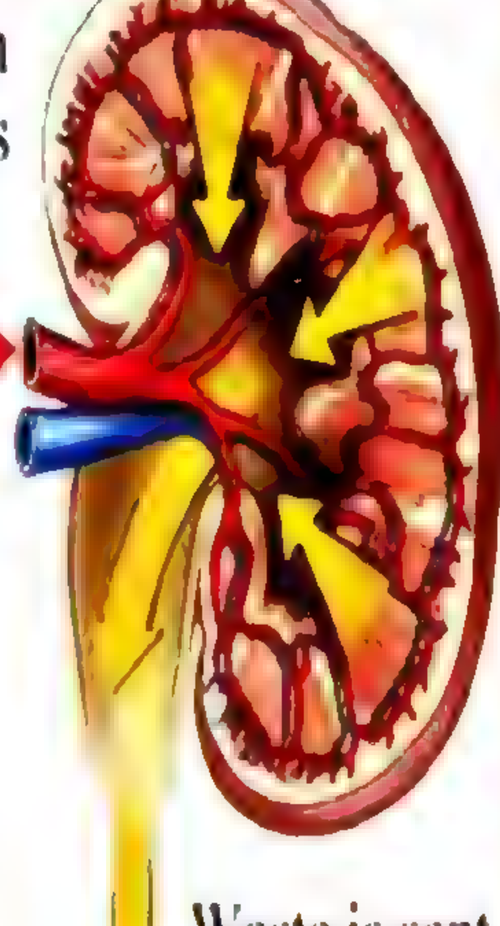
4-After the filtering is completed urea, other waste materials and water become urine.

5-Urine leaves each kidney through a narrow tube called ureter.

6-Urine is removed from the bladder through another tube called urethra.







Notes:

1-If your body doesn't get rid of waste, you will get sick.



2- **Digestive system** doesn't share in excretion (it doesn't work on the materials produced from **burning food inside the body cell.)**

3-**Blood cells** and **proteins** are too large to pass through the **nephron**
So they can't pass through it.

4-**Urination** is the process of expelling urine from the body.

5-**Engineers** design special devices to work instead of kidney organ which filter the blood from waste materials.

6-Studying a kidney model instead of a real kidney saves time, money and effort **and saves people's life**.

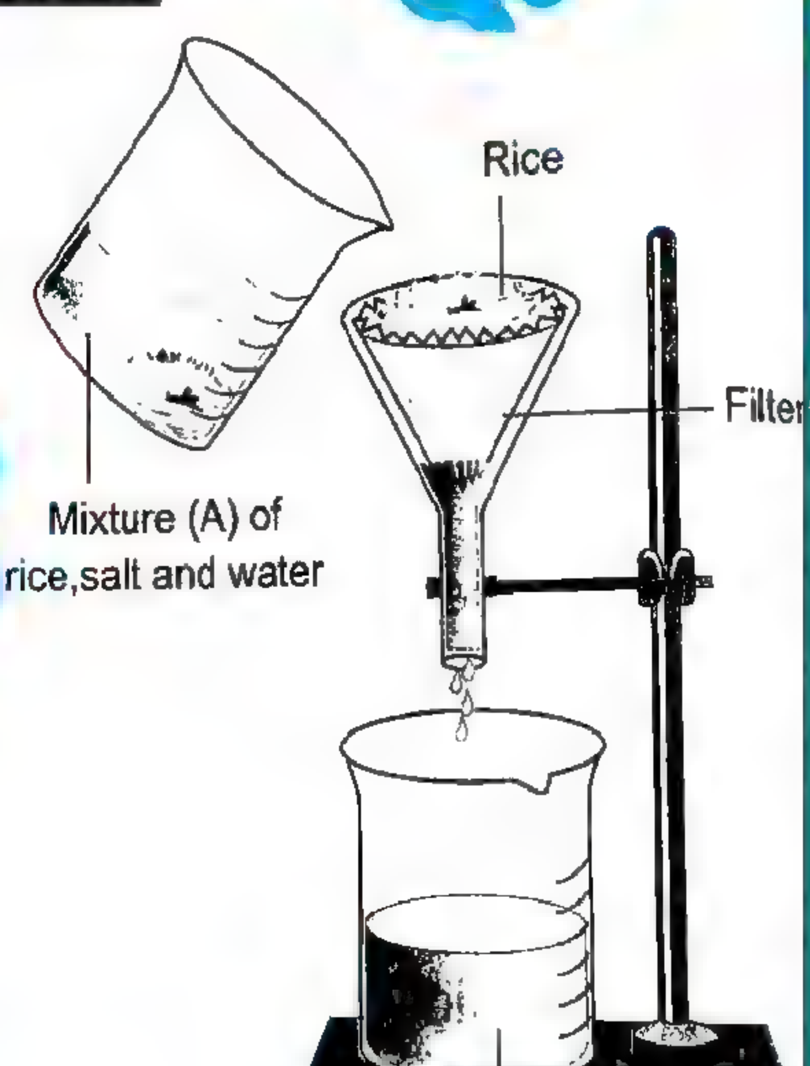
This figure shows getting rid of waste:

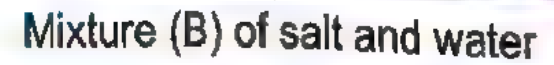
1-The filter in this figure is like kidney in the urinary system.

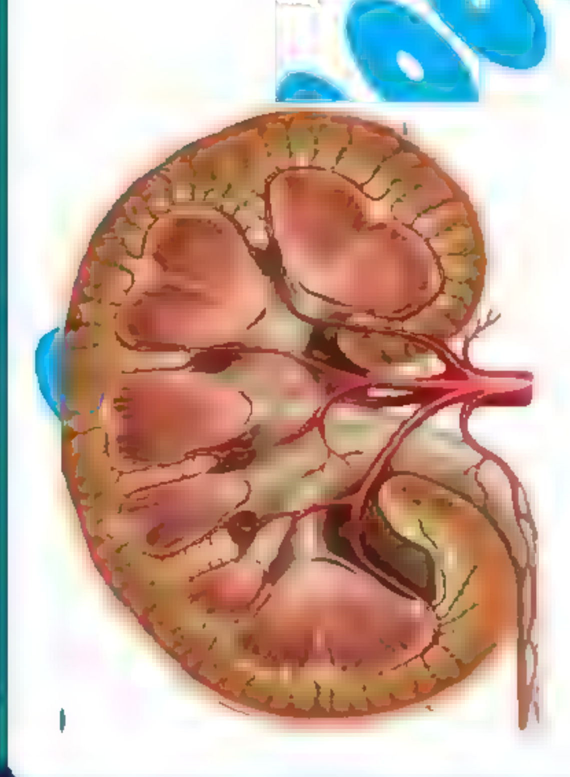
2-Mixture (A) is like blood before filtering which is found in the body.

3 –Mixture (B) is like filtered blood that comes out from the body.

4- Rice is like proteins and blood cells which can't pass through nephrons during filtration the blood.











WORKSHEET (4 AND 5)



Q.1) Choose the correct answer:

1- The systems of the human body get their needed energy from ....

a)The sun   b) water   c) food   d) carbon dioxide

2- All the following are from the nutrients that the food contains, except ......

a)carbohydrates   b) oxygen gas   c) fats   d)proteins

3-The organ which belongs to the digestive system and secretes fluids that contain an acid and some enzymes is the ....

a)Esophagus   b) stomach   c) small intestine   d)mouth

4-In small intestine ,.......help (s) in breaking down of food by secreting some enzymes.

a) Pancreas only   b) gall bladder only

c) Pancreas and gallbladder   d) pancreas and lungs

5-Walls of small intestine contain.......which responsible for absorbing nutrients of digested food.

a)blood vessels   b)hairs   c)glands   d)nephron

6-Blood carries..............formed inside the small intestine to all body organs.

a) feces   b)undigested food   c)bones   d)nutrients

7-The body gets rid of waste materials by ....process.

a)digestion   b)excretion   c) respiration   d)sensation

8-All the following are responsible for excretion process, except.........

a) digestive system   b)skin

C) respiratory system   d)urinary system

9-All the following are from the waste materials which produced by your body except………………….

a)Urine b)oxygen c)carbon dioxide d)sweat

10- The two kidneys play an important role in the filtration of ……inside your body.

a) Water b) enzyme c)acid d)blood

11- The blood which carries the waste materials, enters each kidney through a large ……………

a) Vein b)artery c) blood capillaries d)ureter

12- The tube which transports the urine from the kidney to the bladder is the ………..

a) Vein b)urethra c) ureter d) artery

13-Among the substances which can't pass through the kidney's nephrons are…..

a)blood cells and urea b)blood cells and proteins
c) proteins and urea d)water and urea

14- The two kidneys remove waste materials as …………,and expel them in the form of urine.

a) water and urea b) urea and blood cells

c)water and proteins d)proteins and blood cells

Q.2) Put (√) or (x):

1- System get their needed energy from the food we eat. ( )

2- Digestion process begins when the food enter the esophagus. ( )

3- The digested food enters the colon as a soupy mixture. ( )

4- Circulatory system transports the digested food to different body organs .( )

5- The main waste product which is expelled by respiratory system is the urea. (   )

6- The two kidneys remove waste materials from undigested food which come out in the form of urine. (   )

7- Studying a kidney model can save time, money and effort. (   )

Q.3) Write the scientific term:

1- The process of breaking down the complex food into simpler substances.

(.................................)

2-The last part of large intestine that stores the feces until it leaves the body.

(.................................)

3-A substance that stored in liver and muscles, then converted into glucose when your body needs energy.

(.................................)

4- The microscopic filter that is found in the two kidneys and filters the blood from waste materials.

(.................................)

5- It is the process of expelling urine from the body.

(.................................)

6-A substance which is formed due to breakdown of proteins inside the body cells.
(.................................)

[illegible]

1- The body needs to convert complex food into simpler substance.

2-Stomach secretes a digestive fluid when the food reach it.

3- Importance of excretion process to your body.

4- Walls of small intestine contain blood vessels.

5- Blood cells and proteins cannot pass through the kidney's nephrons.

[illegible]

1- Saliva is not secreted during chewing the food inside your mouth.

2- Your body doesn't get rid of waste.

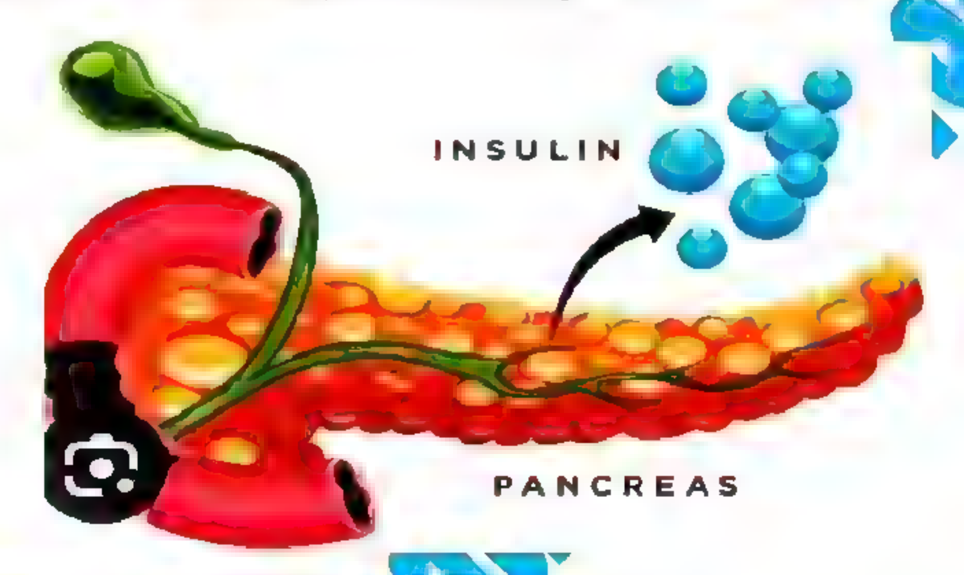
3- The blood that carries waste materials passes through nephrons of the two kidneys.

4- The blood doesn't pass through the two kidneys during its circulation inside the human body.

Lesson (6)

- **Insulin:** hormone that regulates amount of sugar that the body can use for energy.

Insulin produces from **Pancreas** (one of the organs of endocrine system).

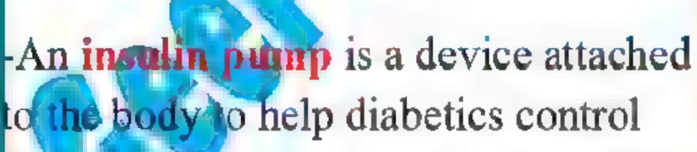


Diabetes disease : One of the disorders of endocrine system.

-People with diabetes are unable to make or use **insulin** ,so it stays in the blood causing many problems.



-These people must monitor the level of sugar in their blood.



-An **insulin pump** is a device attached to the body to help diabetics control the blood sugar level with automatic insulin injection.

- Researchers are working to develop an artificial pancreas.

Artificial pancreas will be an internal organ that pumps insulin as needed.



WORKSHEET (6)

Q.1) Choose the correct answer:

1- Insulin hormone is responsible for regulating the level of ………in the blood.

a) Proteins b)fats c)water d)sugar

2- Pancreas belongs to ……system and its secretions help in completing …..process.

a) endocrine-digestion b)circulatory respiration
c) digestive- urination d)endocrine-sensation

3-People who suffer from diabetes can use the insulin pump device that injects the body automatically with……………….

a) Sugar b)water c)insulin d)carbohydrates

Q.2) Complete the following sentences using the words below:

(insulin pump – endocrine - pancreas – blood - diabetes –insulin –energy)

1- People that have a problem in secreting insulin hormone will be infected by………..

2- The human body uses sugar to get its needed ……….for doing all vital activities.

3- Pancreas is one of the organs of ……………system that produces ……….hormone.

4- Researchers are working to develop an artificial ……………….to pump insulin internally inside the human body.

5- Insulin regulates the sugar level in the……………

6- Diabetic can control the blood sugar levels by using …………..device which automatic injects the body with insulin.



Q.3) Write the scientific term:

1- The system that helps in regulating sugar level in the blood by secreting a specific hormone. (…………………….)

2- A hormone that controls the level of sugar in the human blood. (……………………..)

3- A device that is used by diabetics to help them control the blood sugar level with automatic injections of insulin. (…………………………)

4- A disease that is resulting from the disorder of secreting insulin hormone by pancreas. (…………………….)

Q.4) Give reason :

- Diabetic must give themselves regular shots of insulin.

……………………………………………………………………………………………

……………………………………………………………………………………………

…………………………………………………………………………………

Q.5) What happens if ?

-Pancreas doesn't make its function correctly.

……………………………………………………………………………………………

……………………………………………………………………………………………

……………………………………………………………………………………………





Concept (3) Lesson (1)

- Behind the wall, there are many wires leading to electrical outlets and light fixtures that conduct the electricity to all parts in the house.
- electric energy transfers to the device that are powered by electricity through wires.

Example of electric circuits:

- **Electrical poles**



Electric poles that support electric wires between cities and the wires inside walls are all examples of electric circuits.

How is electric circuit considered as a system ?

The electric circuit is a path for electricity that consists of many components that work together as one system.



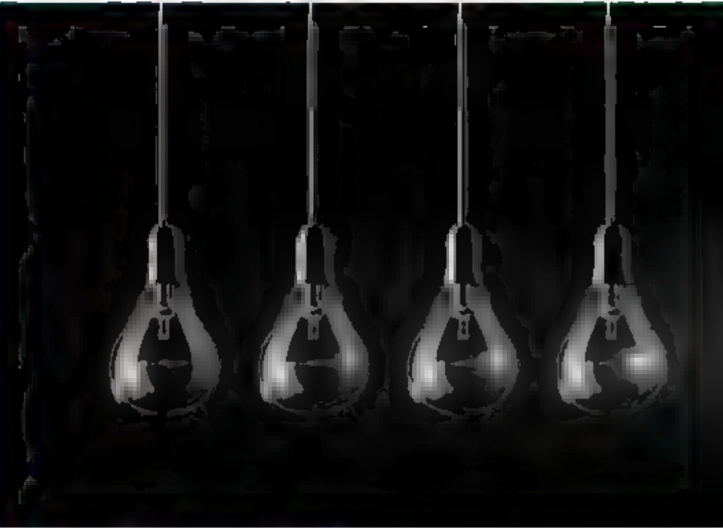
Light bulb trouble



There are different ways to connect the components of an electric circuit.

1-Series connection

picture (1)



2- Parallel connection

picture (2)



- **In picture (1):**

When a light bulb burns out, all the other light bulbs are turned off because they are connected together in a way known as "series way"

- **In picture (2):**

When a light bulb burns out, all the other light bulbs still light because they are connected together in a way known as "parallel way"

Magnetism and Gravity

- **Gravity and magnetism are forces that affect us every day.**
- **The two forces are different from the other forces**

because objects do not have to come into contact with one another to get affected by gravity or magnetism.



Gravity at work :

• Gravity (gravitational force):

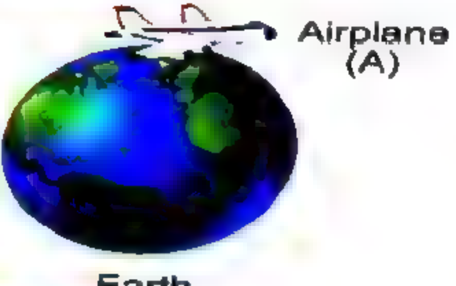


It is a force that affects everything which has mass.

• Earth has great mass compared to everything located on its surface, so all objects on or near Earth's surface are pulled toward its center.

Factors affect the force of gravity:

1. Distance.



As the distance between objects and the center of the Earth increases, the gravitational force decreases.

Ex. The force on plane (A) is greater than that on plane (B)

2. Mass.

If the mass of an object increases, the gravity will increases.

Earth attracts all objects on its surface due to its great mass.

• We cannot see gravity, but we can observe its effect on objects such as :

- Gravity holds you to the ground.

-When you throw a ball upward into the air, it will stop moving upward at a certain point and it returns back to the Earth. (Give reason)

Due gravity.

Magnetism at work:

• Magnets are made of iron and other materials.

•A magnet has a force called "magnetism".

• **Magnetism allows the magnet to attract certain materials without making direct contact.**

• Magnetism allows magnets to attract or repel other magnets.

Magnetic Field:

• **It is the area around the magnet in which its magnetic force (magnetism) appears.**

• Magnetism affects certain objects that are in its magnetic field.

- We cannot see magnetic field and gravity but we can only observe their effects.

✸ To see the magnetic field of a magnet, allow a magnet to attract some iron fillings.



Similarities and differences between gravity and magnetism :

Gravity	Magnetism
Similarities	
✸ It is not necessary for objects to come into contact with one another to get affect by gravity and magnetism. ✸ Gravity and magnetism are similar in that we cannot See them.	
Differences	
Gravity attracts any object that has mass. Gravity is always downward pulling force.	• Magnetism attracts certain materials only. • Magnetism is considered as : -A pulling force when it attracts objects or another magnet. -A pushing force when it repels another magnet



Concept (3) Worksheet (1)

Q. 1 Put (√) or (x):

1. The force of gravity increases between objects when the distance between them increases. (   )
2. Electric circuit is the path for electricity that consists of many components that work together as one system. (   )
3. Electricity and magnetism can work together. (   )
4. Earth attracts all objects on its surface due to its great mass. (   )
5. During the falling down of an object towards Earth's surface, the gravity force increases. (   )

Q.2 Write the scientific term:

1. The area around the magnet in which its magnetic force appears. (……………………)
2. The force of Earth which attracts all objects on its surface to its center. (……………………)
3. The force that allows the magnet to attract some materials without making direct contact. (……………………)

Q. 3 Complete the following sentences :

1. This tool is surrounded by an area called……………..
2. We can observe the force of this tool by using…………… which make pattern around it.





Lesson (2)



Magnetic and Non-magnetic materials

MAGNETIC METALS 

NON-MAGNETIC METALS 



1. **Magnets attract some metals only, such as iron (steel), nickel and cobalt.**
2. **The magnetic objects are attracted to the magnet from far distance when these objects locate at the magnetic field of the magnet.**

magnetic materials	Non-magnetic materials
• They are materials that are attracted to the magnet. •Examples: Iron, nickel and cobalt	They are materials that are not attracted to the magnet. •Examples: Aluminum, plastic, copper, paper and wood



Worksheet (2)



Q.1 Choose the correct answer:

1... is a magnetic material that is attracted to the magnet.

a. Copper b. Iron

c. Gold d. Wood

2. Some materials cannot be attracted to the magnet because they are ...

a. magnetic materials b. made of nickel, iron and cobalt.

c. non-magnetic materials. d. located at the magnetic field of the magnet.

3. When we put a piece of aluminum foil close to a magnet, it will....

a. be attracted to the magnet. b. be a magnet.

c. not attract to the magnet. d. repel with the magnet.

4. Al the following materials are called magnetic materials, except...

a. iron. b. plastic

C. nickel. d. steel.

5. Magnet affects certain objects like …...when they locate in its magnetic field

a. wood and steel b. nickel and plastic

c. iron and copper d. cobalt and steel

6. The area around the magnet in which magnetism can be observed is known as ....

a. magnetic materials. b. magnetic field.

c. non-magnetic materials. d. iron filings



Q.2 Complete the following sentences:

1. Magnets attract some metals, such as............,.............. and ....

2. The magnetic materials will be attracted to the magnet when they are located at ....of the magnet.

3. If we put a wooden spoon near to a magnet it will not attract to it because it is made of ......materials

4. Materials are classified according to their ability to be attracted to the magnet into.........,.............

5. Copper and..............will not attract to the magnet as they are.......... material

Q.3 Give reasons for:

1. Cobalt and nickel are considered as magnetic materials.

....
....
....

2. Wood and copper are not attracted to the magnet.

....
....





Lesson (3&4)

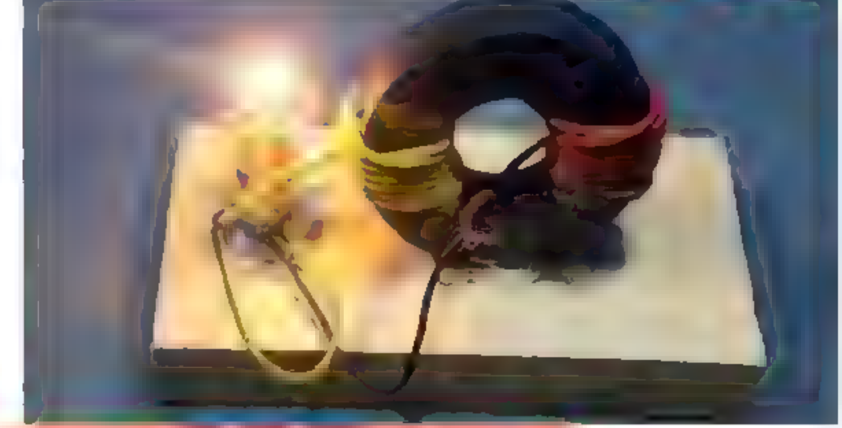


Generating electricity

Generator: is a device used in generating electricity.

Structure: It consists of:

1. Large magnets
2. Coiled wires.



Function:

It changes mechanical energy (kinetic energy) into electrical energy used in lighting houses and operating electrical devices.

How does a generator work?

When large magnets spin at a high speed, the spinning magnets create electrical charges on the coiled wires, so electricity is produced.

There are different forces that can be used to make

the magnets in the generator spin to generate electricity, such as :

1. Water in dams is used to operate water turbines, causing the magnets in the generator to spin.





2. Winds are used to operate wind turbines, causing the magnets in the generator to spin.

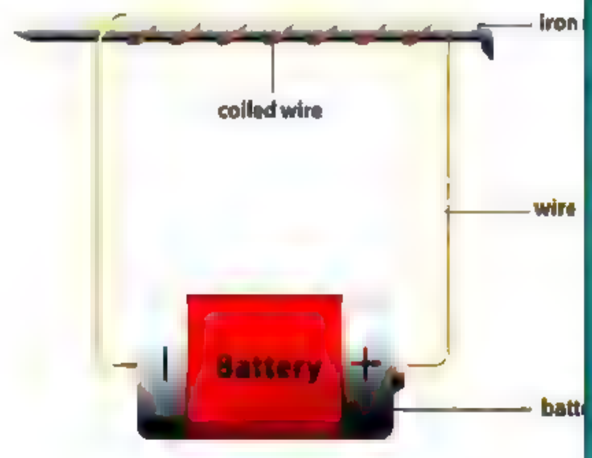


3. Sources of fuel such as oil and coal are used to make water boil producing steam which causes the magnets in the generator to spin



Energy as a System

Some information about electricity (electrical energy) and magnetism (magnetic energy).

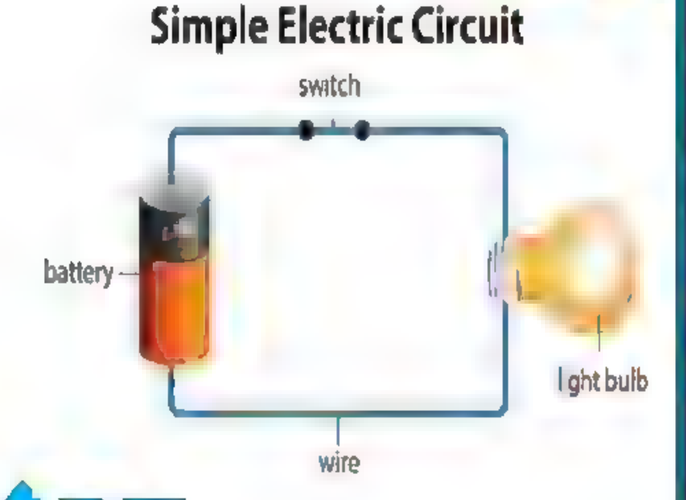


- **The flow of electricity through wires is known as "electric current".**
- The electric current comes from the movement of tiny charged particles (electrons) through conducting wires.
- **When an electric current flows through a wire, it forms a magnetic effect around the wire known as "magnetic field".**
- If a wire wrapped around a metal core, the magnetic field produced by the flowing current is strengthened, so the metal core attracts the iron nails.



Electricity and magnetism can work together.

- **Electricity:** is a form of energy that comes from a flow of electric charges (electrons) moving along a path.
- **Electrons** must flow in a steady stream, which is known as an "electric current".
- **Electric current :** is the flow of electric charges (electrons) along a closed path.



- **Electric circuit (the loop):**
 is a path for transmitting an electric current.

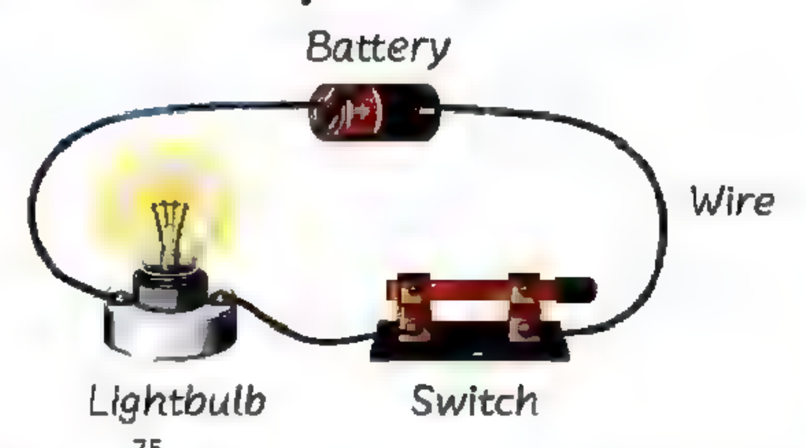
Note:

- To make the electric current flow through a circuit, the loop (circuit) must be closed (it must begin and end in the same place without any breaks in the loop).

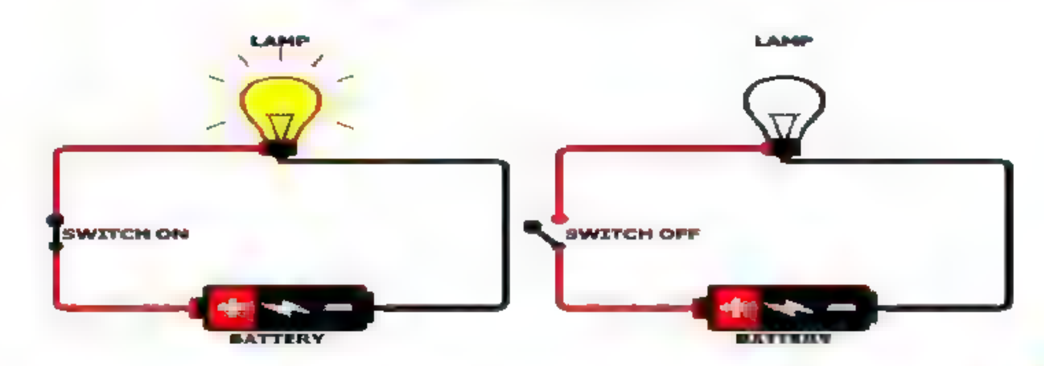
Battery or wall socket are the source of electricity in the electric circuit.

Components of electric circuits:

1. A metal wire.
2. An electric power source.
3. A switch.
4. An electric device.



The switch



- **Switch** ;is a tool to open and close the electric circuit.
- **Switch** can be automatic such as the internal switch on a thermostat, which adjusts the temperature inside devices such as the refrigerator.
- **Switch** can be manual such as a wall switch for lights.

- When the switch is closed (turned on), it closes the circuit (closed electric circuit), so the electric current flows through the circuit.

-When the switch is opened (turned off), it opens the circuit (opened electric circuit), so the electric current doesn't flow through the circuit.

What happens if: the electric circuit doesn't contain switch.

We can't open or close the circuit.

Electric conductors and insulators :

Electric conductors	Electric insulators
They are materials through which electric current (electricity) flow easily	They are materials through which electric current (electrons) does not flow easily.
"good conductors of electricity'	"bad conductors of electricity'
Examples: All metals such as copper and aluminum	*Examples:* Plastic Rubber



Current safety :

- Most electric wires are coated with rubber or plastic which are bad conductors of electricity, to protect people from electric shock.

. Touching non insulated wire that an electric current flows through causes an electric shock and may cause death, because the human body contains a lot of water which is good conductor of electricity



Worksheet (3 and 4)



Q.1 Write the scientific term

1. The device which changes mechanical energy into electrical energy. (…………………)
2. A form of energy produced from generators and turbines. (…………………)
3. The flow of electrons through an electric wire. (…………………)
4. A closed loop through which electric current can flow. (…………………)
5. A tool in the circuit which is used to open and close the circuit. (…………………)
6. It is used to adjust the temperature inside some devices such as the refrigerator. (…………………)
7. The materials that the electric charges can flow through. (…………………)
8. They are materials that don't allow electric current to flow through. (…………………)

Q.2

Choose from column (B) what suits it in column (A) :

(A)	(B)
1. Electricity	a. is a closed path through which electrons move.
2. Electric conductors	b. are materials that electric charges flow through.
3. Electric circuit	c. is a source of electric charges in the circuit.
4. Electric insulators	d. is a form of energy.
5. Battery	e. is used to open and close the circuit.
	f. are materials through which electrons can't flow.

1. ………… 2. ………… 3. ………… 4. ………… 5. …………

Q.3 Put (v) or (x):

1. Wood and plastic are electric insulators. (   )

2. Electric current can flow through all materials. (   )

3. Electric wires are covered with plastic to protect us from electric shock. (   )

4. Electric insulators only allow electric current to pass through them.(   )

5. Copper, rubber and iron are electric conductors. (   )

6. Materials made of metals can conduct electricity. (   )

7. If your hand touches an insulated wire you will be shocked by electricity. (   )

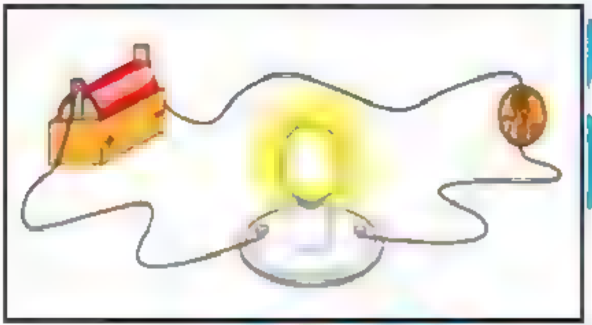
8. Glass is a good conductor of electricity, while water is a bad conductor of electricity. (   )




Lesson (5)

Construct an electric circuit

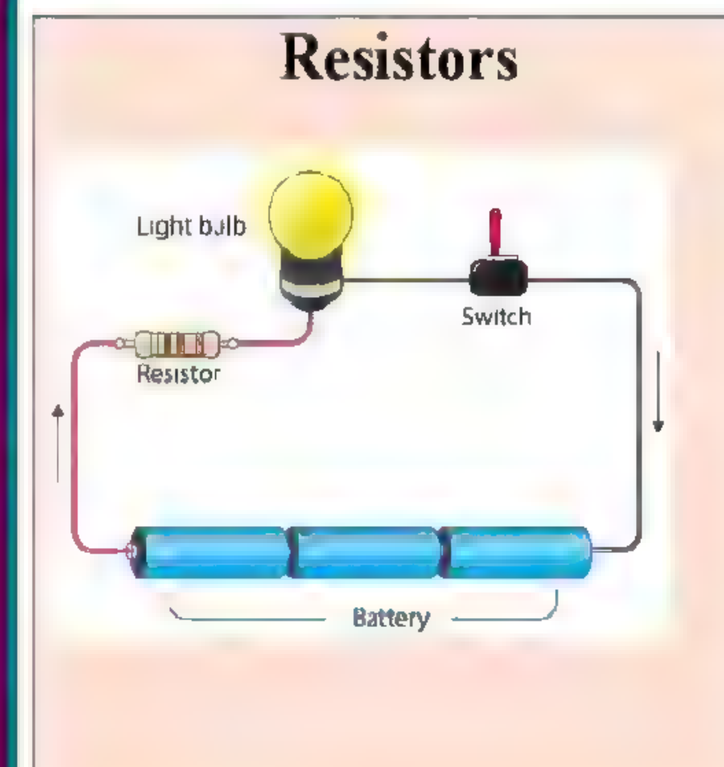
- Classify the materials according to their **conductivity** of electricity to :

P . O . C	Electric Conductors	Electric insulators
Definition	They are materials that **allow electrons** to flow through them	They are materials that **don't allow** electrons to flow through them
Examples	Aluminium - Copper - Iron - Paper clip - Coin	Plastic - wood - cloth - rubber
		

Importance of insulators

- **stop** the flow of electricity so they keep you safe from getting shocked by the electric current
- **plastic is an insulator that coats wires and plugs (G.R)** to keep you safe when you are handling them

Resistors



they are **components** of an electric circuit that **limit** that the **flow of electric current**.

- **Its important :**
  It is used to **slow** the flow of electrons through an electric circuit to avoid the damage of electric circuit.
- **Found in :**
  1-Toasters 2-Microwaves
  3-Electric stoves

The electric ciruits can be connected in two different ways

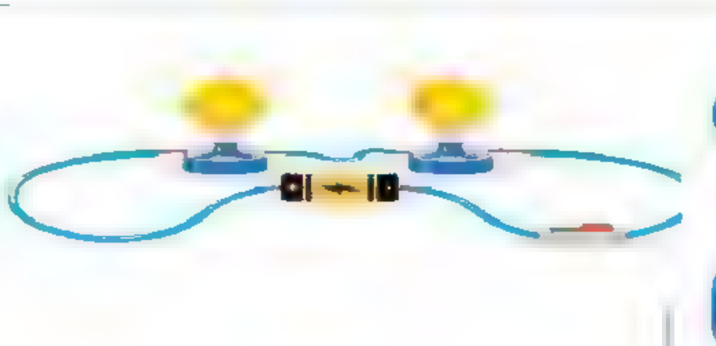
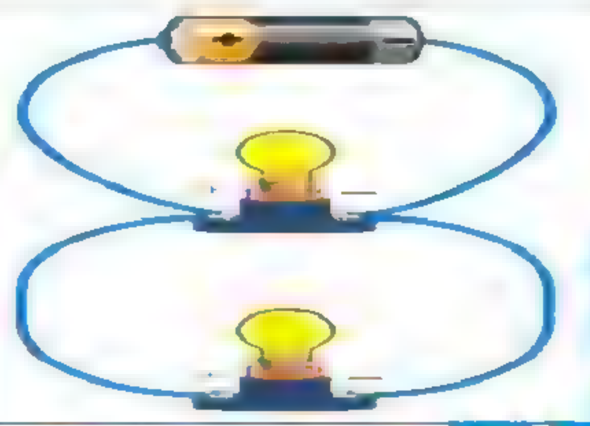
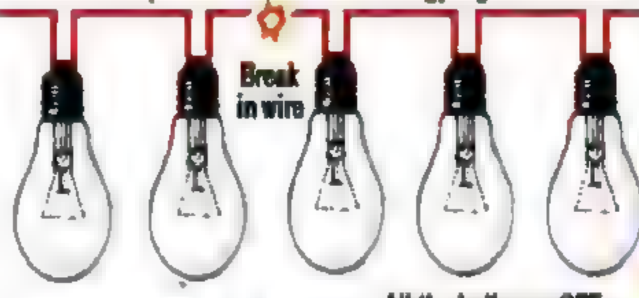
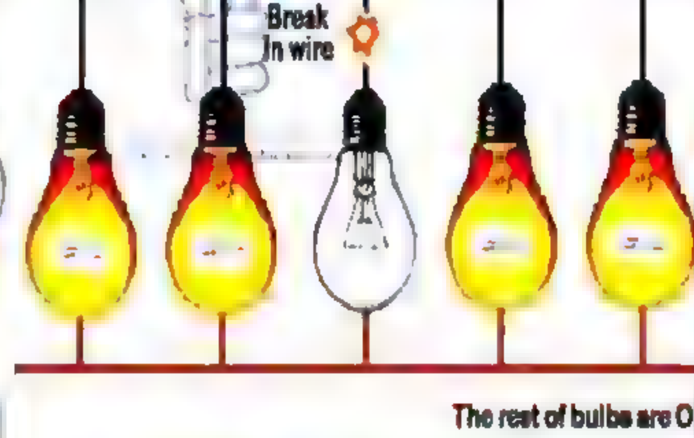
Series circuit

Parallel circuit

❖ The difference between series and parallel circuits :-

Series circuit	Parallel circuit
• All the components must be **connected** in a single loop. (one path)	• The light bulbs are **connected** in two or more different branches of the circuit.



	
• The electric current can only flow along one path	• The electric current can flow along more than one path
• If one light bulb blows out or disconnected, the others will not work.	• If one light bulb blows out or disconnected, the other light bulb will remain work.
 	 Parallel Connection
	Advantages: **Parallel circuit are found in our houses to operate devices and If one of a device turn off , the others will continue.**

Note :

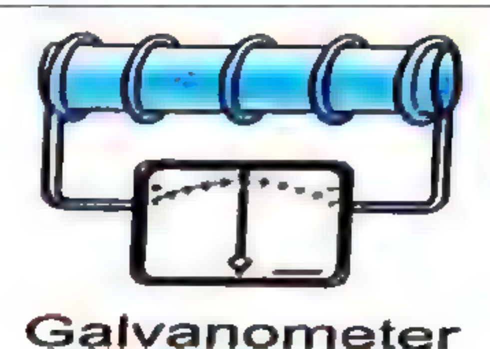
• **Towns and cities are part of an electric circuit, where :**

1-The energy source is the power plant which has generators that push out electricity.

2- The electricity **travels along conductors** called **power lines** into all kinds of electrical devices in houses, businesses and factories.



Galvanometer	It is a device used to detect the flow of small electric current


Galvanometer

✓ **How a magnet can generate electricity ?**

1-A wire coiled around a hollow cylinder

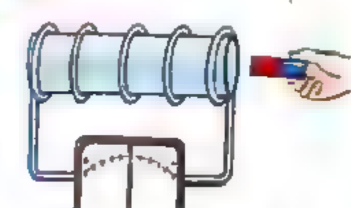
2- The coil is connected to a galvanometer.

2- A magnetic bar is placed in different distances from the coil.

Observation:

1-When the magnet was placed at rest away from the coil.

(What happens)?

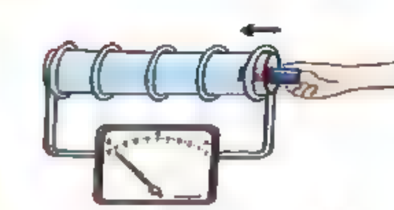


The needle of the galvanometer did not move .

Which indicates that there was no electric current flow .

2-When the magnet was moved toward and into the coil.

(What happen)?

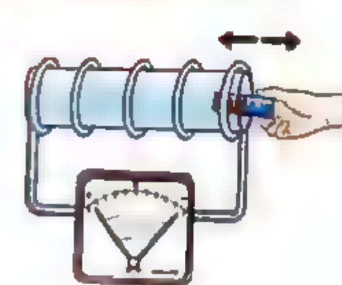


The needle of the galvanometer moved to one side ,

Which indicates that there was an electric current flow

3-When the magnet was moved rapidly back and forth inside the coil.

(What happen)?



The needle of the galvanometer also moved rapidly

Note

When the movement of the magnet Increases ,

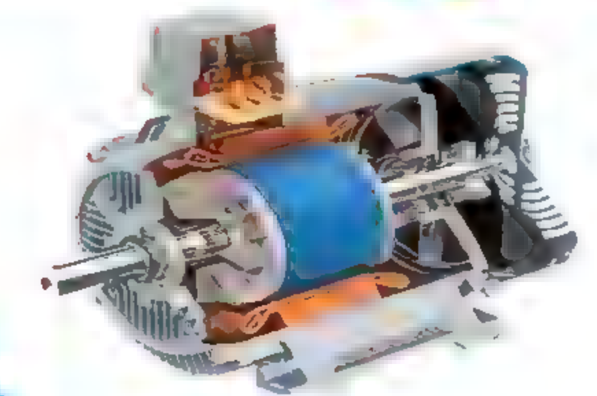
the generated electric current increases .

Note :

- If the **number of loops** in the coil **increases** , the **movement of the needle** of the **galvanometer** will **increase**
- which indicates that the amount of generated electric current **(Voltage)** will **increase** .

There is relation between magnetism and electricity, which is used in :

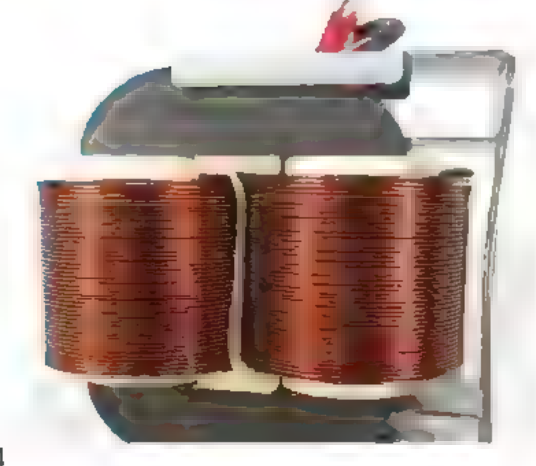
1-Electric motor



2-Electric generator



3-Electric transformer







Worksheet (5)



Q.1) Choose the correct answer :

1-…………………are used to stop the flow of electricity.

a-Resistor   b-Electric conductors

c-Electric insulators   d-Galvanometer

2-Scientists use a ………………to detect the flow of small electric currents.

a-generator   b-galvanometer

c-battery   d-switch

3-Resistors are found in all of the following devices , except ……………..

a-toasters   b-microwaves

c-electric stoves   d-batteries

Q.2)Complete the following sentences :-

1-Rubber is an electric ……………., while copper is an electric ……….

2-Electric wires are coated by …………..as it an electric insulator.

3-The electric current can flow through different branches in ……………circuits.

4-Electric circuits in houses are connected in ………………way.

Q.3) Write the scientific term :-

1-A device can be used to detect the flow of small electric currents .

(..............................)

2-Materials that don't allow electrons to flow through them easily .

(..............................)

3- Materials that allow electrons to flow through them easily .

(..............................)

Q.4) Put (√) or (×) :

1-Towns and cities are parts of an electric circuit . ( )

2-When a magnet is placed at rest away from copper coil, an electric current will be produced. ( )

3-There is no relation between magnetism and electricity. ( )

Q.5) Give reason :-

1-Some electric circuits contain resistors ?

....

Q.6) What happens if :-

1-Electric circuits in houses are connected in series.

....

Concept (3) Lesson (6)

➢ **How an electrical system can improve the function of a body system.**

Heart	• Is a muscle that beats consistently for the duration of our lives

✓ **Give reason :**

The heart has a natural pacemaker ?

To create electrical currents that it sends out through the heart , causing the heart to contract.

Note :

- When the natural pacemaker starts to fail , **sometimes we need an artificial pacemaker ? (G.R)** To keep the heart beating correctly

Artificial pacemaker 	• **It is a device that operates with a battery** • **It is inserted into the chest and stimulates the heart muscle to beat at regular intervals for patients who have a slow or irregular heartbeats.** • **It has been in use for over 60 years.**

✓ **What happen if:**

A patient has a slow or irregular heartbeats?

An artificial pacemaker is inserted into the chest and stimulates the heart muscle to beat at regular intervals.

To build a pacemaker , you need

- A battery
- An insulated electric wire
- A motherboard

The future of pacemakers

✓ **Give reason :**

1-Scientists provide the new artificial pacemaker by a built – in antenna.

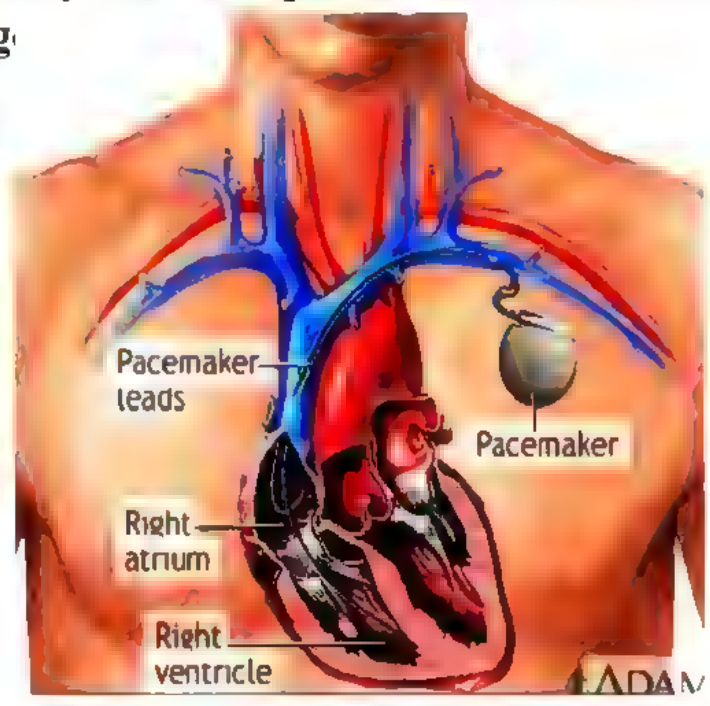
To send information to physicians, so they know how the heart is behaving

Note :

- **Pacemakers are getting more advanced by the year and becoming smaller too.**
- **Today , doctors can place a tiny , effective pacemaker well within the heart with a simple surg**

Pacemakers are medical devices to treat SLOW Heart arrhythmias





Worksheet (6)



Q.1) Write the scientific term :-

1-A muscle in the human body that beat regularly to push the blood inside the body. (…………………………..)

2-A device inserted into the chest to stimulate the heart to beat regularly. (…………………………..)

Q.2) Put (√) or (×) :

1-Sometimes electricity can be used to help our body parts to move . (   )

2-The heart is important in our body as it helps in food digestion. (   )

3-The artificial pacemaker should contain a battery to do its function. ( )

Q.3) Choose the correct answer :

1-The artificial pacemaker is inserted into the ……………of the human body.

a-brain b-chest c-legs d-hands

2-The …………….is a muscle that beats inside the human body to push the blood to all body parts.

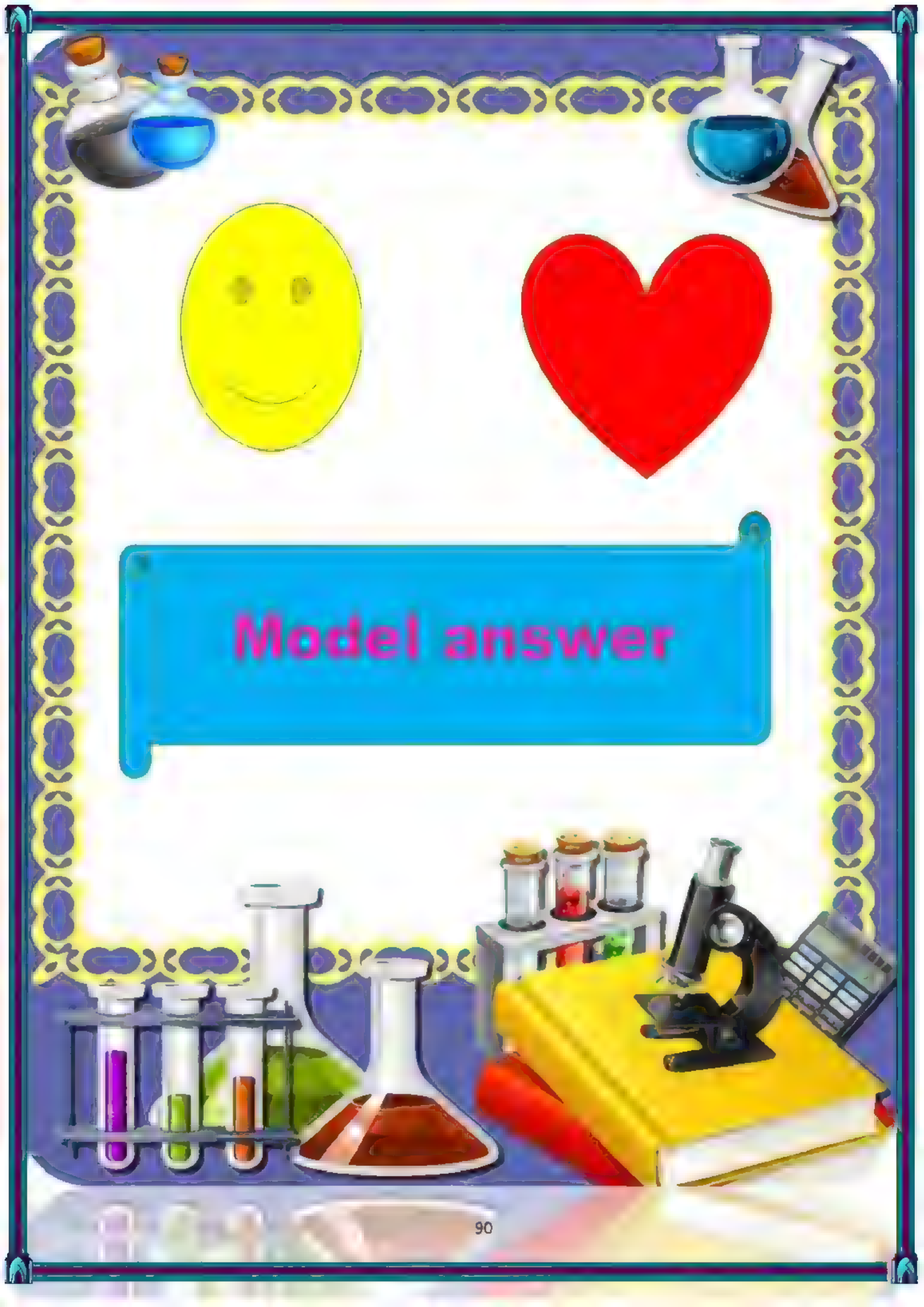
a-stomach b-brain c-heart d-hair

Q.4) Give reason:

1-The heart has a natural pacemaker.

……………………………………………………………………………………

……………………………………………………………………………………


Model answer



Concept (1) Worksheet (1)

Question 1: choose the correct answer.

1- (b)　　2-(d)　　3-(b)　　4-(a)

Question 2: give reason.

1-because it made up of one cell only

2-because it regulates the substances that pass in or out of the cell

Question 3: write the scientific term.

1-(multicellular living organisms)

2-(microscope)

3- (waste material)

4-(water)

Question 4: what happen if.

1- The cell will swell until it bursts

Worksheet (2)

- Choose the correct answer:

  1- b　　2- a.　　3- a.

- Correct the underlined words:

1- enormous cells

2- Eyepiece

- Put (✓) or (x) :

1- (✓)　　2- (x)　　3-(✓)

- 1.Write the following labels :

  1- Eye piece　　5- Base
  2- Objective lens　　6- Fine focus
  3- Stage　　7- Coarse focus
  4- Illuminator　　8- Stage clips

- 2.microscope

Concept (1) Worksheet (3)

Q.1: Choose the correct answer:

1. 40 trillion	2. xylem cells	3. cells	4. muscle tissue	5. cell wall

Q.2 A Study the following three figures, then answer:

1. (…b….) 2. (…a…)

Q.3 Complete the following: -

1. Nucleus	2. Cell membrane	3. Mitochondria	4. Cytoplasm

Q.4 Give reasons for:

1. Because some substances can pass through it, while others cannot.
2. Because it is responsible for controlling cell activities, such as making proteins and cell division.
3. Because they are powerhouses that supply the cell with energy and cellular respiration takes place in it.

Q.5 What happens if:

1. The cell has no definite shape.
2. The cell doesn't supply with energy and cellular respiration doesn't take place in the cell.

Q.6 Complete the following sentences using the words between the brackets:

1. Organelles – similar
2. Tissues – Cells
3. Nucleus

Q.7 Correct the underlined words:

1. organs
2. tissues
3. nucleus
4. The cell (plasma) membrane
5. Cellular respiration
6. animal

Q.8 Cross out the odd word:

1. Heart 2.Blood cell



Concept (1) Worksheet (4 and 5)



Q.1) Choose the correct answer :

1-a	2-a	3-d

Q.2) Write the scientific term :

1- Vacuole	2-Photosyntheis process	3-Respiration process	4- Cytoplasm

Q.3) Correct the underlined words :

1-an exoskeleton	2- Protein

Q.4) Give reason : 1- Because they don't have chloroplasts

Q.5) What happen if : 1-The protein cannot move into the cell .

Q.6

1-Plant cell and Animal cell

2-a-Nucleus b- Cytoplasm c- Mitochondria d-Vacuole e- -Chloroplast f-Golgi apparatus

Worksheet (6)

Q.1)Choose the correct answer :

1-a	2-d

Q.2) [illegible]

1-×	2-×

Q.3) Complete the following sentences :-

1-Methylene blue	2-Cell biologists

Q.4) Give reason :-

1- To watch how cells can work to repair body parts or how cells respond to different medicines.

Q.6) Write the scientific term :-

1-Cell biologists	2-The 3D microscope

CONCEPT (2) WORKSHEET (1)

1- Complete the following sentences

1- Digestive

2- Nervous

3- Digestive and circulatory

4= Nervous

5- Brain

2- Put (√) or (×)

1-(√)

2-(×)

3-(√)

4-(×)

3-What happen if

The brain sends a signal to the muscles that contract and allow his body to face the danger.

4-Give reason:-

1- Because the digestive system provides the skeletal system with nutrients needed for fracture healing

2- To perform their function

3-Because nervous system controls the movement of muscles of heart.



CONCEPT (2) WORKSHEET (2)

1- Put (√) or (×):-

1-(×) 2-(√) 3-(×) 4-(×) 5-(√)

2-Write the scientific term:-

1- Muscle cells
2- Muscle
3- Muscloskeletal system
4- Skeletal muscle

3-Give reason

1- To allow the movement.
2- Because the size of the muscle cell is very small.
3- Because the skeletal muscles that attached to the bones of skeletal system allow these bones to move.



CONCEPT (2) WORKSHEET (3)

Q.1) Complete:

1- Contraction.

2-Cardiac – involuntary.

3-Glands – hormones –pressure.

4-Gases ,nutrients and hormones.

5-Neck muscles – forearm muscles.

Q.2) Write the scientific term:

1- Respiratory system.
2-involuntary muscles.
3-Endocrine system.
4-Cardiac muscles.
5-Skeletal muscles.

Q.3) Give reason :

1- Because it moves automatically and we can't control it's movement.

2- Because the endocrine system secrets hormones which cause increasing the heartbeats rate to face the danger.

Q.4) What happens to:

1- The lungs take in the air rich in oxygen.

Q.5)

1-2

2-2

3-1

4-oxygen



CONCEPT (2) WORKSHEET (4 & 5)

Q.1) Choose:

1-c 2-b 3-b 4- c 5-a 6-d 7-b 8-a
9-b 10- d 11-b 12-c 13-b 14-a

Q.2) Put (√) or (x):

1- √ 2- x 3-x 4- √ 5-x 6- x 7-√

Q.3) Write the scientific term:

1- Digestion process. 2-Rectum. 3-Glycogen.
4-Nephron. 5-Urination. 6- Urea.

Q.4) Give reason:

1- Because the body cells use this simpler substance to get energy and grow.

2-To allow more food breakdown.

3- To keep the body healthy by collect the waste materials produced by cells and remove them from the body.

4 To carry the nutrients to all body parts after completing digestion process.

6- Because they have large size.

Q.5) What happens if ..?

1- The food can't be easily soften and chemical breakdown of food will not happen.

2- The body will get sick.

3- The blood will be filtrated from harmful substances.

3- The blood will not be filtered from the waste materials and the body will get sick.

CONCEPT (2) WORKSHEET (6)

Q.1) Choose the correct answer:

1- d   2-a   3- c

Q.2) Complete the following sentences using the words below:

1- diabetes   2- energy   3- endocrine - insulin

4- pancreas   5- blood   6- insulin pump

Q.3) Write the scientific term:

1-Endocrine system.   2-Insulin hormone.

3- Insulin pump   .4-Diabetes.

Q.4) Give reason :

- To regulate the sugar level in blood.

Q.5) What happens if ?

-The person will be infected with diabetes disease.

CONCEPT (3) WORKSHEET (1)

Q.1 1. (×) 2. (√) 3. (√) 4.(√) 5.(√)

Q.2

1. The magnetic field   2. Gravity.   3. Magnetism.

Q3 1. magnet - iron.

2. magnetic field.

3. iron filings.



CONCEPT (3) WORKSHEET (2)

Q.1

1-b 2. C 3. C 4. b 5.d 6. b

Q.2

1. iron, nickel- cobalt. 2. the magnetic field 3. non-magnetic

4. magnetic – non-magnetic 5. plastic - non-magnetic

Q.3

1. Because they are attracted to the magnet.

2. Because they are non-magnetic materials.

CONCEPT (3) WORKSHEET (3 & 4)

Q.1

1. Generator. 2. Electricity. 3. Electric current.

4. Electric circuit. 5. Switch. 6. Thermostat.

7. The electric conductors. 8. The electric insulators.

Q. 2 1.d 2. B 3. a 4.f 5. c

Q.3

1. (√) 2. (x)

3. (√) 4. (x)

5. (x) 6. (√)

7. (x) 8. (x)



CONCEPT (3) WORKSHEET (5)

Q.1) Choose the correct answer:

1-b	2-c	3-d

Q.2) Complete the following sentences:

1-insulator - conductor	2-plastic	3-parallel	4- parallel

Q.3)Write the scientific term:

1-Galvanometer	2-Electric insulator	3-Electric conductors

Q.4)Put (√) or (×):

1-√	2-×	3-×

Q.5) Give reason :-

1-Because resistors are used to slow the flow of electrons through an electric circuit to avoid the damage of its components.

Q.6) What happens if:

1-If one light bulb is disconnected, the other one will not work .

CONCEPT (3) WORKSHEET (6)

Q.1) Write the scientific term:-

1-The heart	2-Artificial pacemaker

Q.2) Put (√) or (×):

1-√	2-×	3-√

Q.3) Choose the correct answer:

1-Chest	2-heart

Q.4) Give reason :

1- To creates electrical currents that is sends out through the heart, causing the heart to contract.





Prepared by:

Science Department

Supervisor: MRS. Dalia Fawzy

Mrs. Menna Alla Magdy

Mrs. Sara Bashir

Mr. Abdel Rahman

Mrs. Asmaa Hamdy

Ms. Aya Gamal

Ms. Ghada Gamal

Ms. Nada Mohamed

Mrs. Rahma Essam

Ms. Somaya Mostafa

Good Luck



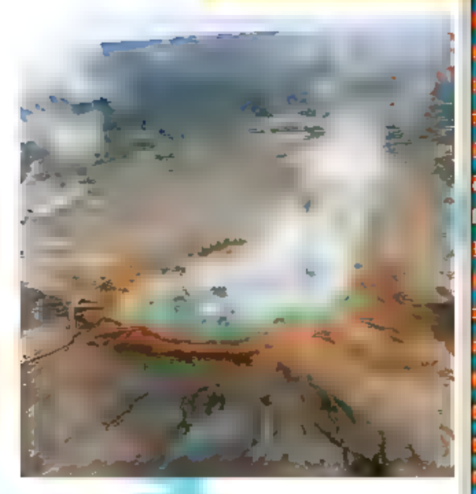
GEEL 2000 Language Schools
Science Department
Primary (6), Unit (2)
First term
(2023/2024)
MATTER
SOLID
Liquid
GAS

Unit 2 Theme 2: Matter & Energy

Concept 2.1: Thermal energy & States of matter

Lesson one

- **A hot spring is formed as follows:**



1. Ground water is heated by molten rocks which are found deep in Earth, then water rises to the surface of Earth and begins to boil.
2. The boiling water in the hot spring changes into steam which is the gas state of water.

Thermal energy depends on the movement of particles of matter.

- **As in the water of the hot spring:**

. When the water is heated, its particles move faster and transfer thermal energy between each other in the form of heat.

. When the thermal energy of particles increases this leads to change in the temperature and the state of water.

Glassblowing:



Manufacturing of glass depends on changing the glass from one state to another.

• When the glass (solid state) is heated at very high temperatures, it changes into molten glass (liquid state)

- **Glassblowing**

is a process to form different shapes of glassware by using a hollow tube contains molten glass at one end of its ends

Where:

1.The molten glass could be blown by a person from the open end of the hollow tube and he could make different shapes of molten glass.
2. Then, the molten glass is cooled forming different shapes of glassware.



- ❖ Everything around us is made of matter.
- ❖ Matter can change from one state into another.
- ❖ All matter is made of particles called **atoms** and **molecules**.

Atom — It is the smallest building unit of matter

Molecule —

Some properties of different states of matter:

P.O.C	Solids	Liquids	Gases
Shape & Volume	Fixed shape and volume.	Fixed volume and variable shape.	variable shape an volume.
Molecules	Held together tightly in their positions. Vibrate around their places. solid	Held together more loosely than solids. Move faster than solids and slide over each other. liquid	Are not held together much more loosely than liquids. Move in all directions. gaseous
	Move slowly Have **the least** thermal energy. EX. Ice cubes SOLID	Move more faster, so they have **moderate** thermal energy. Ex: Water LIQUID	Move very fast, so they have **the most** thermal energy. GAS Ex: Steam

Thermal energy — It is the movement of particles of an object.

✓ The transfer of thermal energy is called **heat**.

Worksheet (1)

Lesson (1)

Put (√) or (x):

1. Matter can be changed from one state to another. ( )
2. Glass can be melted at very low temperatures. ( )
3. Almost all matter contains thermal energy. ( )
4. The movement of particles within an object is used to describe the thermal energy ( )
5. Substances in gas form have the least thermal energy. ( )

Write the scientific term of each of the following:

1. It is the smallest building unit of matter. (……………………..)
2. It is a group of atoms bound together (……………………..)
3. The state of matter at which its particles have the most thermal energy (……………………..)
4. The process of shaping a mass of molten glass by blowing air into it through a hollow tube. (……………………..)
5. The state of matter that has variable volume and shape. (……………………..)

Give reason:

Particles of steam have higher thermal energy than water

……………………………………………………………………………

What happen :

The state of glass when it is heated at very high temperatures.

Lessons (2) and (3)

Kinetic energy

is the energy that molecules and atoms of a substance has due to their motion.

Thermal energy of a substance relates to kinetic energy of its molecules and atoms (Why?)

***Thermal energy of a substance is the total sum of kinetic energy of its molecules and atoms.**

- **The molecules of solids are not moving as fast as molecules of liquids, so solids have less thermal energy than liquids.**
- **Thermal energy (heat) transfers from one substance to another if they have different temperatures.**
- **Heat flows from a hotter substance to a colder substance.**

If you hold ice cubes in your hand that has more thermal energy than the ice cubes, so the ice cubes will melt (Why?)

- Because heat flows from your hand (hotter substance) to the ice cubes (colder substance).

Temperature

It is a measure of the average kinetic energy of molecules and atoms of a substance.

When a substance is heated:

1.Thermal energy is transferred to the molecules of the substance.

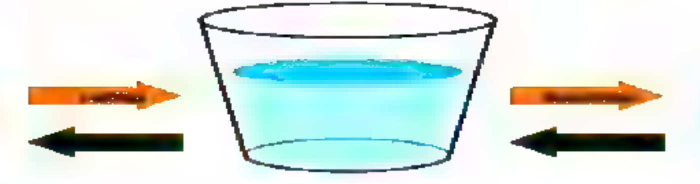
2.The molecules gain thermal energy and move faster.

3. The total kinetic energy of the molecules increases.

4.The temperature of substance increases.

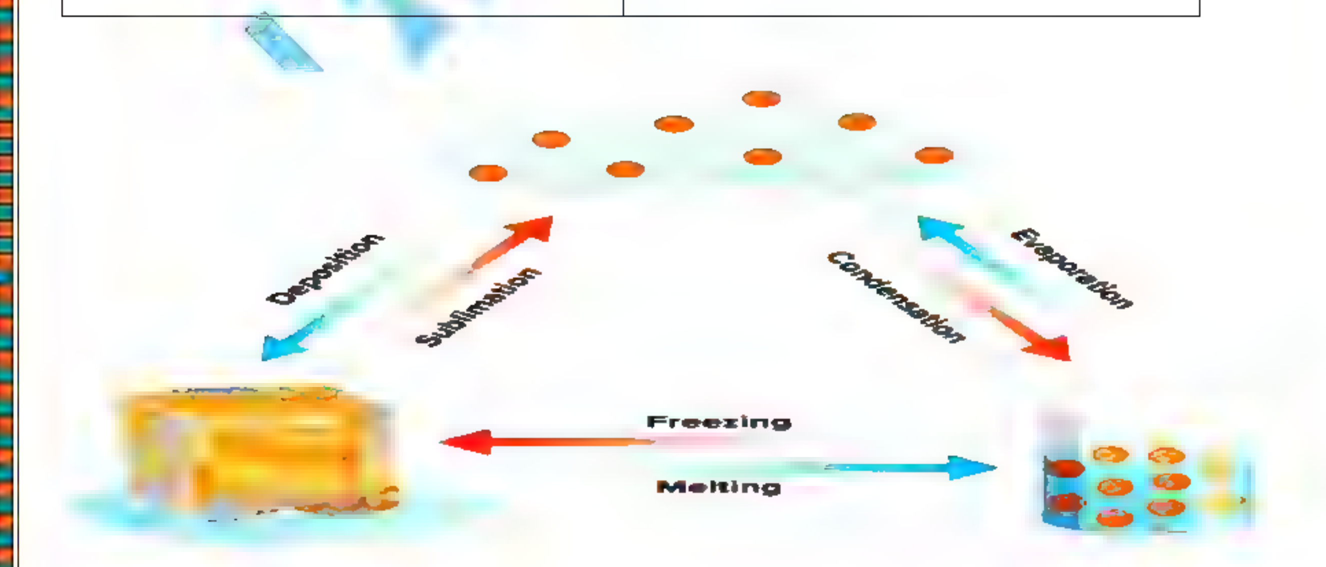
➢ *Changes of State of Matter*

When the thermal energy of a matter changes, the matter will change from one state to another.



"Melting"	"Freezing"
Changing matter from solid to liquid state. *On heating a solid matter: 1.The thermal energy of molecules of solid matter increases. 2.The force that holds these molecules together decreases so; they vibrate faster. 3.Molecules start to move away from each other, so the solid matter changes to liquid matter. Example: Ice changes to water.	Changing matter from liquid to solid state. On cooling a liquid matter: 1.The thermal energy of molecules of liquid matter decreases. 2.The force that holds these molecules together increases so; they vibrate slower. 3.Molecules start to get close together so, the liquid matter changes to solid matter Example: Water changes to ice.

"Evaporation"	"Condensation"
• Changing matter from liquid to gas state. • On heating a liquid matter: 1. The thermal energy of molecules of liquid matter increases. 2. The force that holds these molecules together decreases so; they vibrate faster. 3. Molecules start to move away from each other so the liquid matter vaporizes into gas matter. Example: Water changes to water vapor.	• Changing matter from gas to liquid state. • On cooling a gas matter: 1. The thermal energy of molecules of gas matter decreases. 2. The force that holds these molecules together increases so; they vibrate slower. 3. Molecules start to get close together so the gas matter changes to liquid matter. Example: Water vapor changes to water.



Worksheet (2) and (3)

Give reason:

1. Ice melts when it is put in a hot cooking pan.

....

2. Matter may change from one state to another.

....

3. Evaporation and condensation are two opposite processes.

....

4. Food coloring takes less time to spread out in the hot water than in cold water.

....

What happens if:

1. You hold a piece of frozen chocolate in your hand. (According to transfer of heat)

....

2. You touch a hot cup of tea. (According to transfer of heat).

....

....

3. You heat a piece of butter. (According to change of state).

....

4. The speed of molecules of a matter when it is heated.

....

Write the scientific term of each of the following:

1. **It is a measure of the average kinetic energy of molecules and atoms of a substance. ( )**
2. **It is the change of matter from solid state to liquid state. ( )**
3. **It is the change of matter from liquid state to gas state. ( )**
4. **It is the change of matter from gas state to liquid state. ( )**
5. **It is the change of matter from liquid state to solid state. ( )**

Complete the following sentences:

1. **Thermal energy transfers from one substance to another if they have ………………….. temperatures.**
2. **The process in which liquid changes into solid is called…………. and the reverse process is called…………….**

Choose the correct answer:

1. **Changing from gas to liquid is called……………**

   a. Melting b. evaporation c. condensation d. freezing

2. **When wax melts, its particles**

   a. gain thermal energy and speed up.

   b. gain thermal energy and slow down.

   c. loses thermal energy and speed up.

   d. loses thermal energy and slow down.

3. **In which state(s) of matter are the molecules away from each other?**

   a. Solid. b. Gas. c. Solid & liquid d. Solid & gas

4. **The state(s) of mater with the greatest amount of energy is / are ……….**

   a. **Solid** b. **Liquid** c. **Gas** d. **Solid & liquid**

5. **Water molecules have the lowest kinetic energy when it is in the form of**

   a. **ice** b. **water drops** c. **water vapor** d. **steam**

6. **Changing ice into water followed by changing water into steam show two different processes which are………and…….**

   a. **freezing – condensation**
   b. **evaporation – condensation**
   c. **melting – freezing**
   d. **melting – evaporation**

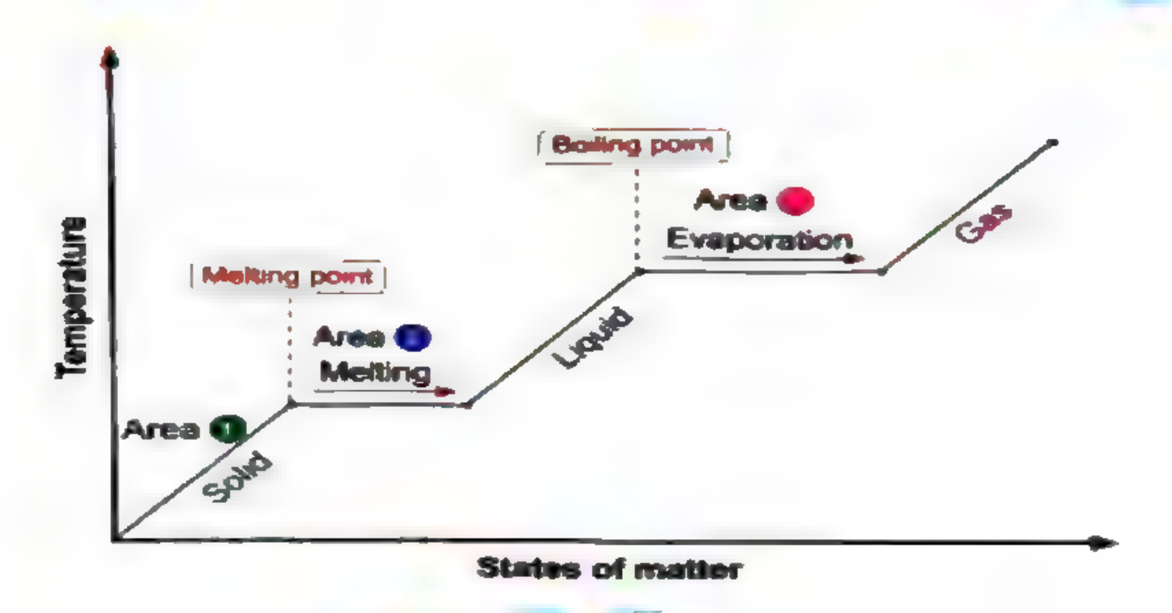
7. **Objects with more thermal energy have………… Kinetic energy**

   a. **More** b. **less** c. **the same** d. **no**

Concept (2-1) Lesson (4)

Thermal energy and particle movement:

The following graph shows the different processes that happen when a beaker of ice cubes was heated until the ice (solid) changes to water (liquid), then water (liquid) changes to water vapor (gas).



At area (1),

When the ice is heated, the molecules of ice absorb thermal energy and they move faster due to the increase of their kinetic energy.

At area (2),

By increasing the temperature, the kinetic energy of ice molecules increases that leads to decrease the force that bonds the molecules of ice together, so they slide over each other and ice (solid) changes to water (liquid), this temperature is called "melting point".

Melting point

It is the temperature at which a matter changes from solid state to liquid state.

Example:

- Ice has a melting point of zero degree (0°C).



At area (3)

By increasing the temperature, the force that holds the molecules together becomes more weak and they spread in all directions, so water (liquid) changes to water vapor (gas) and this temperature is called "boiling point".

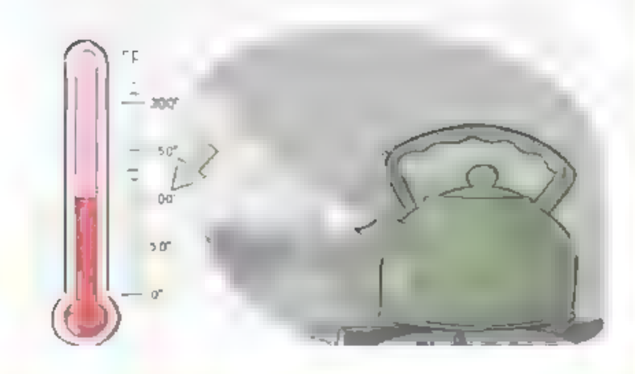
Boiling point :

It is the temperature at which a matter changes from liquid state to gas state.

Examples:

- Water has a boiling point of 100°C.

-Mercury has a boiling point of 357°C

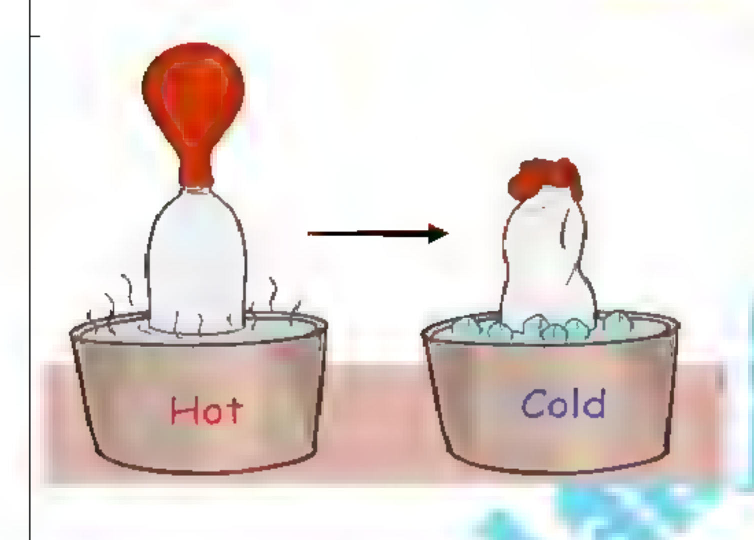
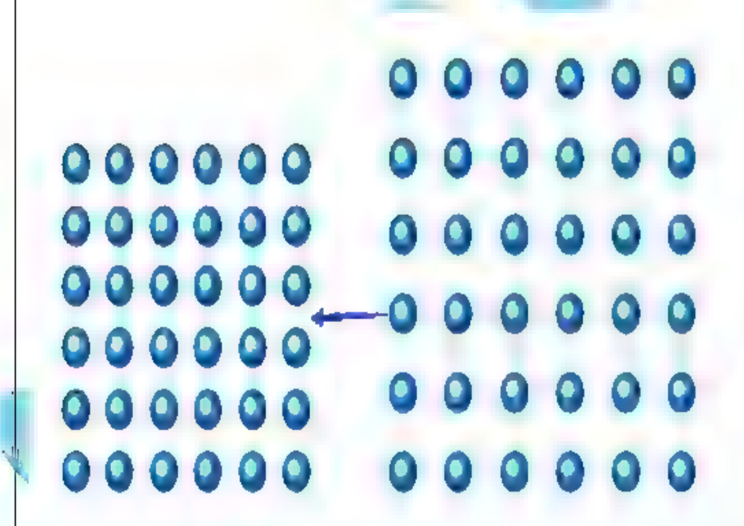
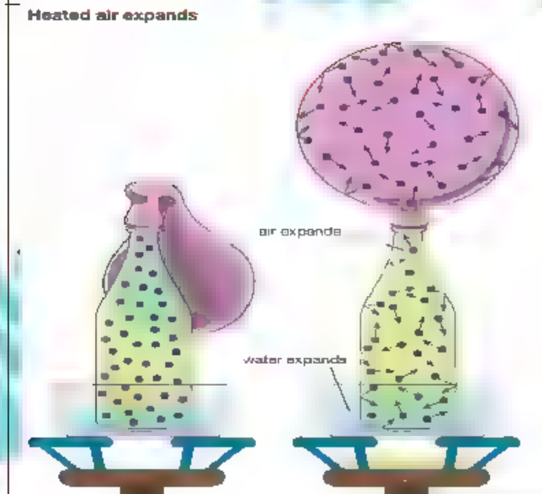
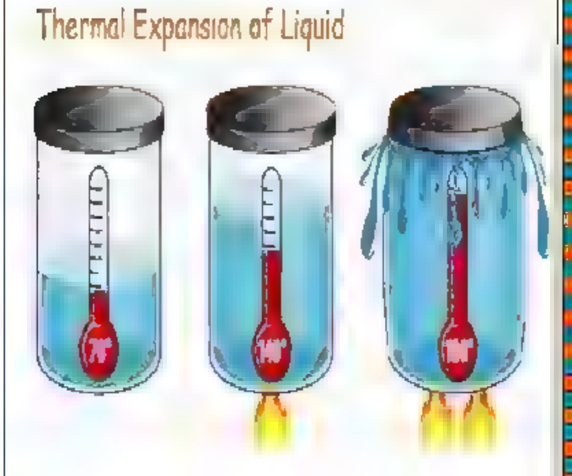


- **Note :**

➢ The melting point and boiling point are physical properties of matter.

Thermal expansion

The matter behave differently when they are heated or cooled .

Contraction of matter	Expansion of matter
When we cool a matter, the spaces between its molecules decrease and the molecules come close together (contract)	- When we heat a matter, the spaces between its molecules increase and the molecules spread out (expand)
 	 

Some examples of the contraction and expansion of some matter:

I- Thermometer :

- Some thermometers contain alcohol (liquid) mixed with color.
- When the thermometer is placed

In hot substance	In cold substance
the temperature of alcohol increases ↓ the spaces between its molecules increase ↓ so the molecules of alcohol spread out and expand ↓ giving high level of temperature in the thermometer.	the temperature of alcohol decreases ↓ the spaces between its molecules decrease ↓ the molecules of alcohol come close together and contract ↓ giving low level of temperature in the thermometer.

2- Jars:

- Sometimes it is hard to open the lid of the jar
- When you pour hot water on the lid of the jar, it opens easily, where:
- The lid of the jar is made of metal.

When hot water is poured on the metal lid

↓

the temperature of the metal lid increases

↓

the spaces between its molecules increase

↓

the molecules of metal lid spread out and expand

↓

So it can be easily opened.



3- Bridges:

- Bridges are made up of steel (metal) and concrete.

- When bridges are exposed to hot weather, the temperature of metal increases and the spaces between its molecules increase, so the molecules of metal spread out and expand.

- So, engineers use expansion joints to keep bridges safe from buckling (bending) when they expand at high temperatures.



Question (1) : Choose the correct answer :

1. On a very hot summer morning, water on the ground may turn into water vapor this change is called…..........

a. melting. b. evaporation. c. freezing. d. condensation

2. Some thermometers contain a colored alcohol, what happens to alcohol when the thermometer is placed in hot water?

a. Alcohol contracts. b. Alcohol evaporates.

c. Alcohol changes its color. d. Alcohol expands

3. When the temperature of a rod of iron is increased,....................

a. its length increases.

b. its length decreases to its half.

c. its length doesn't change.

d. its length decreases to its quarter.

4. When the temperature of alcohol inside thermometers increases, its volume....................

a. increases causing its contraction.

b. decreases causing its expansion.

c. decreases causing its contraction.

d. increases causing its expansion.

5. As a result of heat flow through metals, they................

a. expand. b. contract.

c. get smaller. d. are not affected.

Question (2) : Write the scientific term of each of the following :

1. A device used to measure the temperature . (.....................................)

2. The increase in the volume of a material as its temperature increases . (..)

3. The decrease is the volume of a material as its temperature decreases. (...)

Question (3) : Give reasons for :

1. Engineers use expansion points in the designing of bridges.

....

2. Pouring hot water over a metal lid of a glass jar makes it easier to open the jar.

....

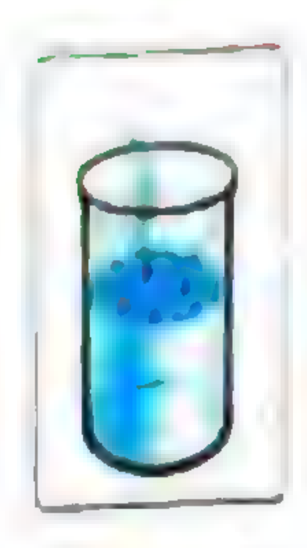
Concept (2-1), Lesson (5)

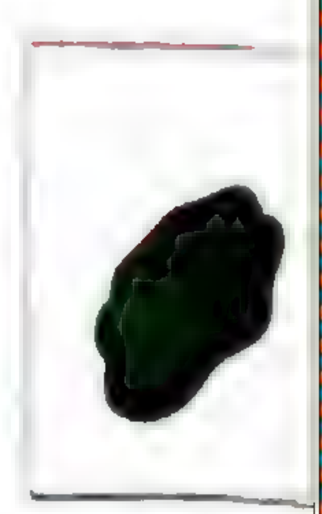
Making a thermometer

Tools


Plastic bottle contains 50 ml of alcohol and 50 ml of water


Plastic straw

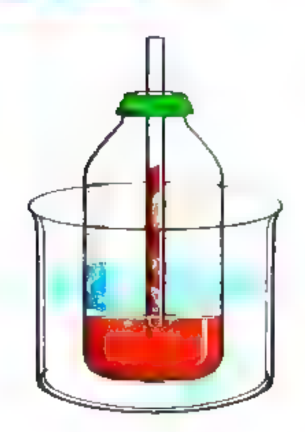
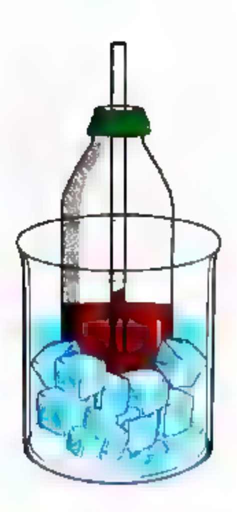

A bowl contains hot water


Clay


A bowl contains cold water


Eyedropper contains red dye

Steps:

1- Add three drops of the red dye in the plastic bottle.	
2-Put the straw in the bottle and fix it by using the clay as shown then measure the height of red liquid in the straw at room temperature .	
3-Place the plastic bottle into a bowl of hot water and measure the height of the red liquid in the straw.  **Observation** The height of the red liquid in the straw increases when the bottle is placed into the hot water.	
4-Place the plastic bottle into a bowl of cold water and measure the height of the red liquid in the straw . **Observation** The height of the red liquid in the straw decreases when the plastic bottle is placed into the cold water .	

Conclusions :

In a bowl of hot water ,

. The temperature of red liquid increases , so the molecules of red liquid spread out and the spaces between them increase.

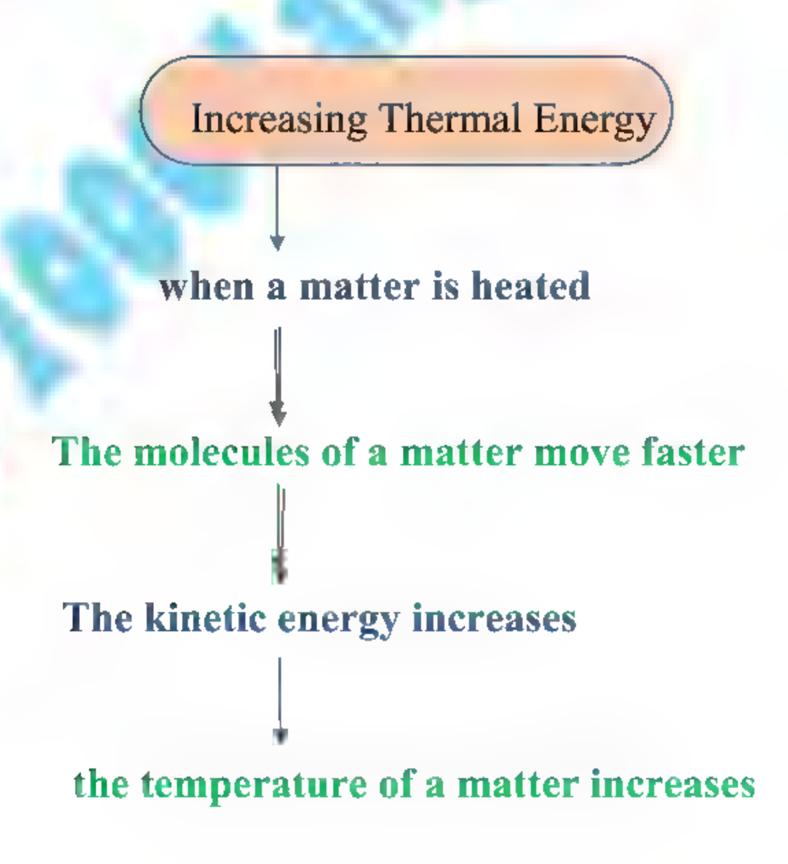
. This leads to the expansion of the molecules of red liquid and increase in the height of red liquid in the straw.



In a bowl of cold water ,

. The temperature of red liquid decreases , so the molecules of red liquid come close together and the spaces between them decrease .

. This leads to the contraction of the molecules of red liquid and decrease in the height of red liquid in the straw .



Increasing Thermal Energy

↓

when a matter is heated

↓

The molecules of a matter move faster

↓

The kinetic energy increases

↓

the temperature of a matter increases



Question (1) : Put (✓) or (×):

1. When the temperature of solids increases, their volume decrease. (   )
2. Substances change from liquid state into gas state during evaporation process. (   )
3. Expansion and contraction of matter occur due to changes in temperature. (   )
4. Expansion and contraction are two opposite processes. (   )
5. When a liquid is cooled, it may change into gas. (   )

Question 2 :Complete the following sentences using the words below :

(expand- contract - faster-slower- increase -decrease- near to-away from - thermometer)

1. Cooling causes matter to............and causes particles to move...........
2. When a liquid is freezed, the spaces between its molecules .... causing their movement.................... each other.
3. Heating causes matter to…...............and causes particles to move...........
4. When a liquid is heated, the spaces between its molecules .... causing their movement......................each other
5. Expansion and contraction of liquids explain how a...........works

Question 3 : Give reason

1-matter expands when it's thermal energy increase.

....

2- The size of a balloon decreases if it is subjected to a cold weather.

Concept (2-1), Lesson (6)

,**Engineers use some techniques to protect bridges and railroad tracks from expansion or contraction in different conditions of weather**

Examples:

[illegible]	[illegible]
In bridges **When the temperature increases in hot weather or decreases in cold weather, the metal that made up bridges expands and contracts.**	**In railroad tracks** **- Railroad tracks are made of iron.** **- Engineers leave small spaces between the railroad tracks to allow these tracks to expand in hot weather without being bent.**
Importance to keep bridges safe over time	**Importance** to avoid train accidents.
	RAILROAD TRACK expansion space



Question (1) : Choose the correct answer:

1- Metallic parts of bridge....................in different temperatures.

a) expand only. b) contract only

c) expand and contract. d) never expand or contract

2- When the kinetic energy of liquids decrease, they may ....

a) expand. b) contract. c) evaporate. d) disappear

3- Railroad tracks are made up of ....

a) glass. b) coal. c) plastic. d) iron

4- Engineers leave .... between railroad tracks

a) small spaces. b) very large spaces)
large spaces d) no spaces

Question (2): Put (✓) or (×)

1. Engineers use expansion joints to keep bridges safe.( )

2. Temperature increases in hot weather causing contraction of materiats.

( )

3. Railroad tracks are made up of iron.( )

4. No spaces are left between railroad tracks.( )

5. Without leaving spaces between railroad tracks, train accidents may occur. ( )

Question (3): Give reason for

1- Expansion joints are designed in bridges.

....

2- Small spaces are left between the railroad tracks.

....

Question (4): Write the scientific term .

1- Joints allow expansion and contraction of some parts of bridges during temperature changes. (...)

2- Decrease the volume of substance as a result of decreasing its temperature. (..)

3- It is the state that doesn't have fixed shape or volume. (..........................)

Unit (2)   Concept 2.2   Lesson (1)

* There are two types of materials according to their ability to transfer thermal energy:

1- Thermal conductors: (Good conductors of heat).

They are materials that allow thermal energy to transfer through.

Example: Metal such as iron.

2-Thermal insulator: (Bad conductors of heat).

They are materials that resist the transfer of thermal energy.

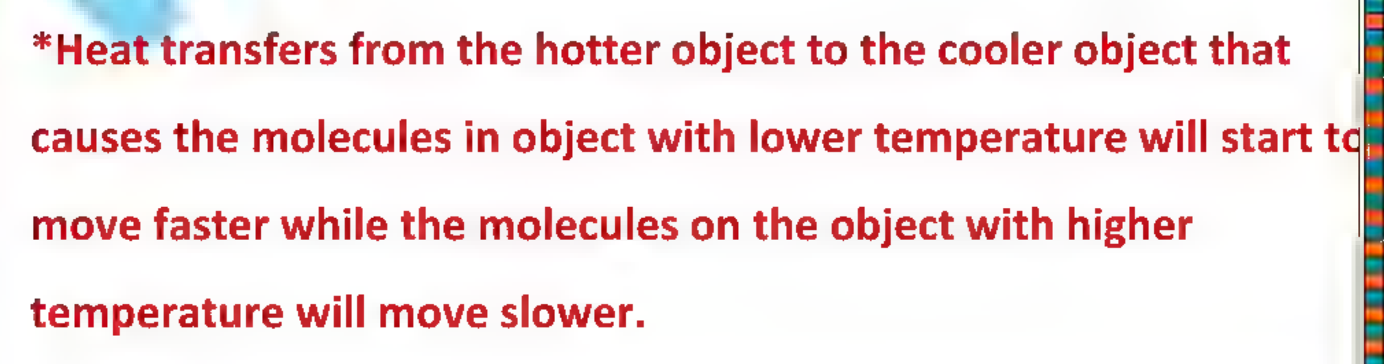
Example: plastic



*Electric iron:

-**Iron:** is a thermal conductor that transfers the heat of the electric iron to the cloth in order to ironing it.

-**Plastic:** is a thermal insulator that doesn't allow heat to transfer through, so you can hold it without feeling the hotness on the electric iron.



*Heat transfers from the hotter object to the cooler object that causes the molecules in object with lower temperature will start to move faster while the molecules on the object with higher temperature will move slower.

*Thermal energy relates to the total sum of the kinetic energy of molecules and atoms of substance, so any substance has thermal energy even the cold substance as they have molecules that always move.

***Properties of heat:**

1-Heat is an essential component of life on earth.

2-Heat flows from a hotter object to a cooler object.

3-Heat cannot be lost but it is only transferred.





1-Write the scientific term of the following:

1-They are materials that allow thermal energy to transfer through.

(..)

2-They are materials that resist the transfer of thermal energy.

(..)

3-Thermal insulator material used to make the handle of an electric iron. (..)

2-Complete the following sentences:

1-Molecules of warmer matter move ……………… than molecules of cooler matter.

2-There are 2 types of materials according to their ability to transfer thermal energy which are ………………..and ………………… materials.

3- Thermal energy relates to the total of sum of the ……………………energy of substance's atoms and …………………

4- Heat transfers from objects with………………temperature to object with………………temperature.

3- Give reasons for:

1-The lower part of an electric iron is made of iron.

……………………………………………………………………………………
……………………………………………………………………

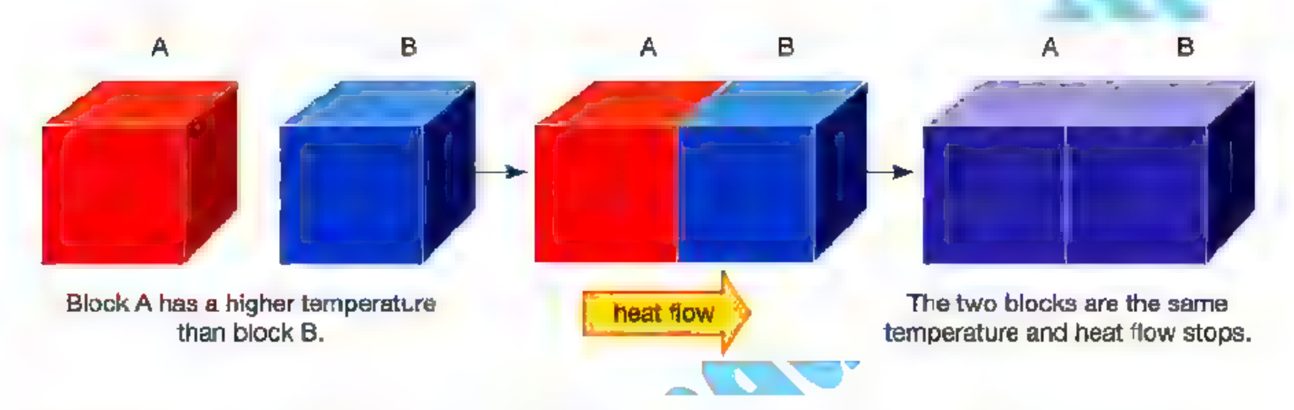
2-You feel heat when you touch a metal spoon placed in a hot cup of tea.

……………………………………………………………………………………
……………………………………………………………………………………

Concept 2.2 Lesson 2

***Heat:** is the transferring of thermal energy from hotter matter to cooler one.

***Thermal equilibrium:** when there is a temperature difference between two objects and the temperature flows from the hotter object to the cooler until both objects reach the same temperature.



Note: The measuring unit of heat is called calorie.

-If you hit a piece of metal several times by a hammer, the piece becomes warm.



***Tools:**

Empty beaker- Beaker contains 100 ml. of hot water with temperature 60°C- Beaker contains 100 ml. of cold water with temerature 10°C- Thermometer - Spoon,

***Steps:**

1- Record the temperature of water in beaker 1 (60°C) and the temperature of water in beaker 2(10°C) in a table.

2- Calculate the averge temperatute of water in the 2 beakers by using the rule:

Average temperature of water=

$$\frac{\text{Temperature of water in beaker1} + \text{Temperature of water in beaker2}}{2}$$



3-Pour the 2 amount of water in the empty beaker then use the spoon to mix them.

4-Wait for 3 minutes and measure the final temperature and record it in the table.

5-Compare the final temperature of water to the average temperature of water that you have calculated before.

Temperature of hot water	60°C
Temperature of cold water	10°C
Average temperature of water	$\frac{60+10}{2} = 35°C$
Final temperature of water after mixi	33°C

***Observation:**

The final temperature of water (33°C) almost equals the average temperature of water (35°C) that you have calculated before.

***Conclusion:**

When 2 substances with different temperature come in contact with each other thermal energy transfers from the hotter object to the cooler object until therm equilibrium happens and they reach the same teperature.

When 2 substances with different temperature come in contact with each other thermal energy transfers from the hotter object to the cooler object until therm equilibrium happens and they reach the same teperature.

Notes:

1- **When mixing (2 substances was different to temperature, their final temperature at the thermal equilibrium almost equals their average temperature, so the final temperature of them is between the temperature of the hotter substance and the temperature of the cooler substance.**

2-In some cases the final temperature when mixing 2 substances with different temperature is less than their average temperature as there is some thermal energy transfers to the air or the container.

3-After mixing 2 substances with different temperature, the motion of their molecules changes:

What happens if:

A hot food is left on a table for sometimes.

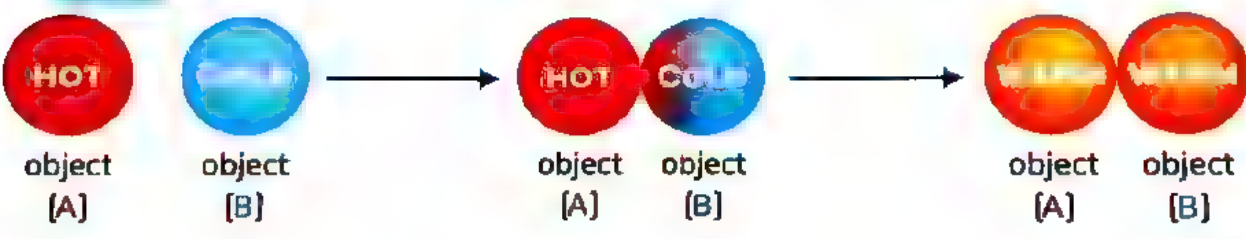
It gets cold.

Give reason:



When a hot food is left on a table for sometimes, it gets cold.

Because The heat flows from the hot food to the cooler a around it.






1-Put (√) or (x):

1-The temperature of the hotter substance increases after it is mixed with cooler substance. (   )

2-After mixing 2 substances with different temperature the molecules movement of the cooler substance becomes slowe. (   )

3-Thermal equilibrium means that the objects in contact reach the same temperature. (   )

4-When mixing 2 substances with different temperature, thier average temperature is lower than their final temperature. (   )

5-When you add some cool water to hot tea, the molecules of tea will move slower. (   )

6-Heat is measured in calorie. (   )

2-Give reasons for:

1-Heat transfer stops after a while between 2 mixed substances with different temperature.

....
....

2-Sometimes the final temperature of a mixing of 2 substances with different temperature is less than their average temperature.

....
....

3-After mixing 2 substances with different temperatures, the molecules of the hotter substance moves slower.

....
....

3-What happens to …?

1-Molecules movement of a hotter substance after mixing it with a cooler substance.

…………………………………………………………………………………………
……………………………………………………………………………

2-The temperature of a piece of metal when you hit it several times with a hammer.

…………………………………………………………………………………………
……………………………………………………………………………

3-The kinetic energy of molecules of a matter when it becomes warmer.

…………………………………………………………………………………………
……………………………………………………………………………

4- Complete the following sentences

1-Molecules of cooler substance move…………………… after mixing it with hotter substance.

2-When you mixing two substances with different temperatures, their final temperature at thermal equilibrium almost…………………….. their average temperature.

3-The final temperature of two mixed substances with different temperatures is between the temperature of the…………………… substance and the temperature of the…………………… substance.

5- Choose the correct answer:

1-The average temperature is almost ……………. the final temperature of the mixture of two substances with different temperatures at the thermal equilibrium.

a-more than　　b- less than　　c- equal to　　d-double.

2-If you pour a cup of water with temperature 30°C to another cup of water with temperature 80°C the final temperature of the mixture may be……...

a-80°C　　b-30°C　　c-50°C　　d-110°C

3-The final temperature of two mixed substances with different temperatures is less than that of the…………… substance and the greater than that of the ………………...substance.

a-hotter-cooler　　b-cooler-hotter

c-bigger-smaller　　d-smaller-bigger

4-After mixing the two substances with different temperatures the molecules of the cooler substance…………………..

a-will move faster　　b-will not be affected

c-will move slower　　d-will stop moving

5-On heating a substance, the…………….. of its molecules……………….

a-kinetic energy- decreases　　b- kinetic energy- increases

c- temperature- decreases　　d- movement- decreases.

Concept 2.2　　Lesson (3)

Conduction, convection and radiation



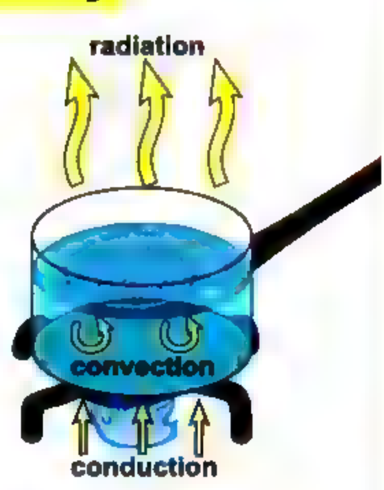
1-Conduction: heat transfers by conduction when objects with different temperature touch each other.

Example:

When you have fever, you put cooling pads to transfer the heat from your body to the cooling pads by direct contact.



✱Heat transfers by conduction in solids only.



2-Convection: heat transfers by convection through liquids or gases.

Example: -During heating the noodles in water, the noodles that are close to the bottom of the pot and near the heat source get hot and raise to the surface, then cold noodles at the surface moves down to the bottom of the pot.

-The movement of noodels up and down shows the movement of

water in the pot during heating, where:

* Hot water at the bottom of the pot moves up.

* Cold water at the surface of the pot moves down.

* The continous movement of water up and down causes the transfer of heat through water by a way of convection.

3-Radiation: heat transfers by radiation through gases and space.



Example: -When your hand gets close to a fire, you feel warm because the air between the fire and your hand allows the thermal energy of fire to transfer to your hand.

-In sunny days you feel the heat of the sun although there is a space between the sun and Earth, the thermal energy of the sun transfers to Earth through the space by radiation.



*The speed of heat transfer between objects increases when:

1-The differences in temperature between objects increases.

2-Surface area of objects increases.

3-Time of contact between objects increases.

Notes:

1- Meteorologists (scientists who study weather) must understand convection and radiation to help them predict the weather.

*Materials are classified according to the rate of transferring heat into:

1-Thermal [illegible]: **they are materials that allow thermal energy to transfer through.**

or they are materials that allow heat to travel freely through them.

Examples: metals such as copper, iron and aluminium.

2-Thermal [illegible]: **they are materials that resist the transfer of thermal energy.**

Or they are materials that slow down the heat transfer.

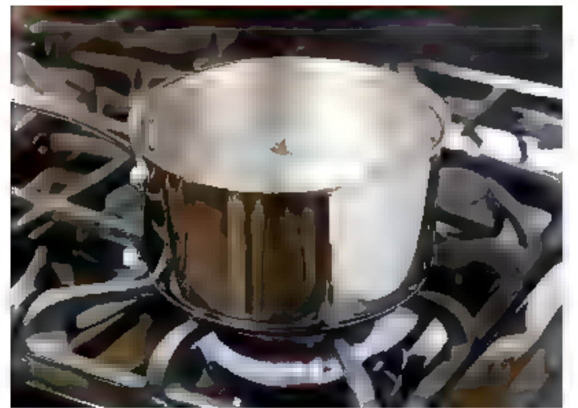
Examples: air, plastic, wood and glass.

Note: Thermal insulators cannot prevented the transfer of heat complete[illegible] but they slow down the heat transfer through them.

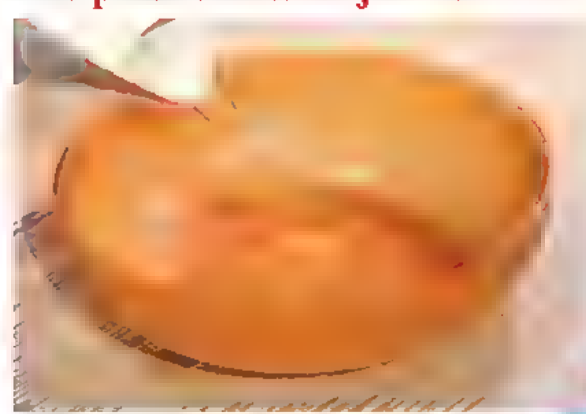
Examples:

1-If you have pour hot water into a metal bowl and a plastic bowl, you will observe:

The metal bowl is hot.



-The plastic bowl is just warm.



*Because:

-Metal is a thermal conductor (allows thermal energy to transfer through).

-Plastic is a thermal insulator (slows down the transfer of thermal energy).

2-If you touch a metal doorknob, you may feel that it's cooler than the wooden door it is on. Because your body always generates the thermal energy, where:

1-Thermal energy transfers fast from your hand to the metal doorknob, which is a thermal conductor.

2-Thermal energy transfers slowly from your hand to the wooden door, which is a thermal insulator.



1-Choose the correct answer:

1-Heat is transferred through solids by……………

a- radiation only **b- conduction an convection**

c-conduction only **c- radiation and convection**

2-Heat is transferred by radiation through……………

a-solids only **b-solids and liquids**

c-liquids only **c-gases and space**

3-Meteorologists are scientists who study………………

a-weather **b-water**

c-rocks **c-cells**

4-Heat transfers from an electric heater to your body by……………when you stand near by it.

a-radiation only **b-radiation and conduction**

c-conduction **c-conduction and convection**

5-All the following materials are considered thermal conductors, expect..

a-copper **b-iron**

c-wood **c-aluminum**

2-Write the scientific term of each of the following:

1-The way by which the heat is transferred through solids only. ( )

2- The way by which the heat is transferred through liquids and gases. ( )

3-The way by which the heat is transferred through gases and space. ( )

4- They are materials that slow down the heat transfers through them. ( )

5-they are scientists who study the weather. ( )

3-Cross out the odd word:

1-Conduction- Convection- Friction- Radiation (…………………)

2-Plastic- Copper- Iron- Aluminum (…………………)

4-Give reasons for:

1-Glass and wood are bad conductors of heat.

……………………………………………………………………………………………
……………………………………………………………………………

2-Aluminum and copper are good conductors of heat.

……………………………………………………………………………………………
……………………………………………………………………………

1-Heat can transfers by three different methods which are…………….. , …………….. and ……………..

2-When you boil water in a pot, the molecules of…………….. water at the bottom of the pot move up and the ……………..of cooler water at the surface of the pot move. ……………..

3-The speed of heat transfer between object…………….. when the surface area of objects increases.

4- Plastic is a thermal…………….. conductor of heat, while copper is a thermal ……………..conductor of heat.

Concept 2.2 Lesson (4)

Heat transfers in different materials

-If we place three temperature measuring devices along the handle of a boot during heating we will see three different temperatures, so the length of the handle is very important.

Examples:

-If you place a pen with 18cm. The handle is made of plastic on a stove and then used to measure the temperature out at three places on the handle. The result can be as follows:

Matter of Handle	Length of Handle(cm)	Time heated(min)	Temperature near pan(°C)	Temperature middle of handle (°C)	Temperature end of handle(°C)
Plastic	18	10	54	24	23

-If you use a pen with a 36cm handle made of plastic, the measurements can be as follows:

Matter of Handle	Length of Handle(cm)	Time heated(min)	Temperature near pan(°C)	Temperature middle of handle (°C)	Temperature end of handle(°C)
Plastic	36	10	54	23	22

-When you change the matter of the handle using a wooden handle with. 36cm length The measurements can be as follows:

Matter of Handle	Length of Handle (cm)	Time heated (min)	Temperature near pan (°C)	Temperature middle of handle (°C)	Temperature end of handle(°C)
Wood	36	10	60	25	24

Conclusion:

*** The measurements of temperature differ from**



one place to another along the handle of the pan.

* The handle is warmer closer to the pan and it is cooler as we go far away from the pan, because the heat travels very slowly along the handle that is made of a thermal insulating material.

*The wooden handle warms up faster than the plastic handle.

-Law of conservation of mass :

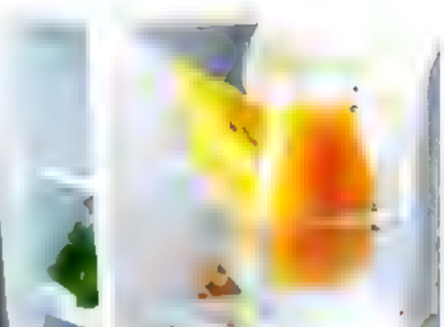
The mass of a substance does not change when this substance changes from one state into another.



•When you put a bowl of ice cubes on the stove, the ice cubes changes into liquid water.

• The mass of the ice cubes before heating equals the mass of water after heating.

•If you put a plastic cup of juice in a freezer, it freezes, but its mass doesn't change before and after freezing.



Give reason:

•There are some cases that the mass of a substance before the change does not equal the mass of the same substance after the change.

That is because the Substance is mixed with other substance.

Example :

If you have 100 gram of popcorn grains and they have a small amount of moisture (water) in them, when they are cooked, they become 97 grams only. The loss in mass is due to the evaporation

(vaporization) of the water during cooking.



Note:

If any liquid substance changes into a gas state, its mass does not change after evaporation even if we don't see its gas state, but it has a mass that equals its mass before change.




1-Put (√) or (x):

1. Matter can't be changed from one form to another. ( )
2. The mass of chocolate bar before melting equals its mass after melting. ( )
3. If you put some juice in a freezer, it changes into a gaseous state, and its mass doesn't change. ( )
4. When water freezes, it loses thermal energy. ( )
5. The temperature increases when we go far away the source of heat.
6. Plastic is better than wood in making the handle of cooking pots. ( )
7. Wood is warm faster than plastic. ( )

2-Complete the following sentences:

1. When a matter changes from one state to another, its.................... doesn't change.
2. The mass of ice cream before melting is ....its mass after melting.
3. Thermal insulating materials such as................. and .... are used to make handles of pots.
4. When chocolate bar melts, it changes from............... state to................state by gaining..................... energy.

3-Write the scientific term of each of the following :

1. A form of energy that gained or lost by the matter to change its state. (………………………………)
2. The mass of a substance doesn't change when this substance changes from one state into another. (…………………………….)

4-What happens to ...?

The mass of a piece of butter after melting it.

....

5- Give reasons for :

1. Decreasing of mass of popcorn grains which have some moisture, after cooking them.

....

2. Plastic is better than wood to make the handle of cooking pots.

....

6- Choose the correct answer :

1. When you put a plastic cup of water in a freezer, the water freezes and its mass ....

a. decreases. b. increases

c. decreases to half. d. doesn't change

2. Matter.............., it just changes from one state to another.

a. neither be created nor destroyed b. can be created and destroyed

c. can't be created but destroyed d. can be created but can't destroy

3. When you melt 100 grams of chocolate bar, its mass after melting is.................100 grams.

a. a lot less than. b. a lot more than

c. a little more than. d. equal to

4. Matter can be changed from one state to another,...................

a. by losing the thermal energy only. b. by gaining thermal energy only.

c. by losing or gaining thermal energy. d. by keeping the thermal energy without change.

5. ...... is the best material to make handles of cooking pots, as it doesn't warm fast.m a. Iron b. Plastic c. Wood d. Copper

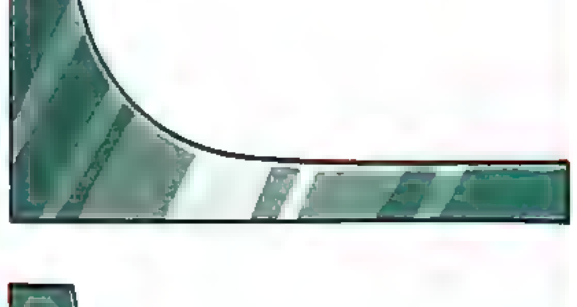
Concept 2.2 Lesson (4)

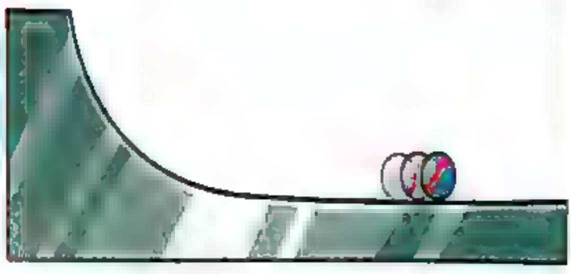
Design a Marble Run

Energy changes from one form to another.

In some cases, when energy changes from one form to another, there are some loss:

In the opposite figure:





-**At the top of the track, the marble has the most potential energy.**

- As the marble moves down the track the potential energy changes to kinetic energy.

- As the marble moves along the track, some kinetic energy changes to thermal energy due to the friction between the marble and the track, that decreases the speed of the marble, so it doesn't reach the end of the track.

NOTE:

If you use a larger marble, it will move downward faster because it has a larger mass so it gains more kinetic energy.



Q.1 Put (√) or (x):

1. Energy can be stored in the form of kinetic energy inside an object. (   )
2. When you go down on a slide, your stored kinetic energy changes into potential energy. (   )
3. Due to the friction force, thermal energy of a moving object changes into kinetic energy. (   )
4. Friction increases the speed of moving objects. (   )
5. A heavier object moves faster than a lighter object when they go down on the same ramp. (   )
6. When a marble goes down on a ramp its potential energy increases. (   )
7. A moving car has potential energy, while stopping car has kinetic energy. (   )

Q. 2 Write the scientifc term of each of the following :

1. A form of energy stored in an object when it is placed on the top of a ramp. (..................................)
2. The energy that the object gains when it moves down on a ramp. (......................................)
3. The energy that potential energy changes into when an object moves down on a ramp. (................................)
4. The energy that kinetic energy changes into when a moving object is affected by friction. (.......................)

Q.3 Give reasons for :

1. Due to friction force, the tires of a moving car becomes hot.
2. A truck is faster than a small car, when both of them move down on the same ramp.

Concept 2.2 Lesson (6)

properties of new materials





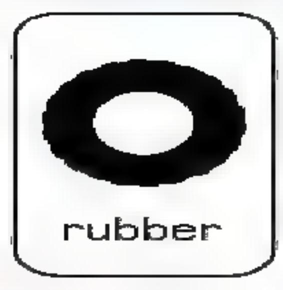












- **People need different materials in different purposes.**
- **Every material is useful for some purposes not for all purposes, so scientists and engineers try to choose the most useful and suitable materials with some useful properties such as flexibility and conducting heat to make the products that people want.**

❖ ✿○□✸▲✚

✸ **When making cloth, scientists use soft materials.**

✸ **When making a bicycle or a car, engineers cannot use cloth.**

Scientists and engineers always work to create or improve new materials For different and new purposes.

Sometimes, when scientists develop a new materials, they focus on some specific properties of a material that they want develop.



Scientists develop a smart material which is a flexible fabric that keeps the temperature of the body.

These smart materials are used in making smart clothes that can

-Control your body temperature

- Light up in the dark

- Keep themselves clean.

Note:

When scientists develop new materials, they study the structure of molecules of materials to understand their chemical structures that helps in understanding their properties.

How are new materials created?

Scientists make new materials by mixing different materials together.

Examples:

Steel:

- It is made of a mixture of iron and other elements.

- It is strong and lasts for a long time.

Concrete :

- It is made of a mixture of rock, sand and water.

-Concrete is in **liquid state** when it is formed, while after it dries, it becomes **in Solid (hard) state.**

- It is **used as the base of buildings and bridges because it is very strong.**

- In some cases, the new materials are created due to the chemical change.

- When chemical change happens, the properties of the new materials differ from the properties of the original material.

Example:

- Plastic is made **by chemical change** of some of the compounds **of petroleum.**

Material	Petroleum (original material)	Plastic (new material)
Properties :	- Liquid. - Burns easily.	- Tough solid. - Often resists burning.

* Petroleum is liquid material, while plastic is solid material.

In some other cases, the new materials are created by mixing materials at high temperatures.

1-Shrink-wrap is created when we add heat to plastic to make it shrink.

2-Glass is a mixture of sand with small amount of other materials such as limestone and soda ash (sodium carbonate).

- Glass is made when the sand mixture is heated in hot furnace so, it melts and changes into glass.

Then the glass becomes hard when it cools.



Q. 1 Complete the following sentences :

1. Smart clothes can.......................in the dark and keep themselves.
2. Steel is made of a mixture of.............and other elements, while concrete is made of a mixture of rock,.................... and................
3. Concrete is in..............state when it is formed, while after it dries, it becomes in .... state
4. Concrete is used as the base of…………..and………… as it is very strong.
5. Plastic is made by .... change of some compounds of…………
6. Glass is a mixture of……………….…. and sodium carbonate.
7. Petroleum is a liquid material, while plastic is………. material.
8. Chemical change of some compounds of petroleum is used in making……….

Q. 2 What happens if ...?

1. You are wearing smart clothes in a dark place.

………………………………………………………………………………

2. Mixing rock, sand and water together.

………………………………………………………………………………

3. Making chemical change to some compounds of petroleum.

………………………………………………………………………………

4. Mixing sand, limestone and soda ash at high temperature.

………………………………………………………………………………

5. Concrete is left to dry.

………………………………………………………………………………



Model answer

Put (√) or (x):

1. √	2. X	3. √	4. √	5. X

Write the scientific term of each of the following:

1. Atom	2. Molecule	3. Gas	4. Glassblowin g	5. Gas

Give reason

Because molecules of steam move faster than water.

What happen

Changes from solid state to liquid state.



Give reason:

1. Because heat flows from the hotter (pan) to the colder (ice).
2. Because the thermal energy of a matter may change, causing a change in the state of matter.
3. Because matter changes from liquid state into gas state in evaporation, while it changes from gas state into liquid state in condensation.
4. Because hot water has more thermal energy and kinetic energy so its molecules move faster than cold water.

What happens if:

1. Heat transfers from the hand to the chocolate.
2. Heat transfers from the cup to the hand.
3. It changes from solid state into liquid state.
4. It increases.

Write the scientific term of each of the following:

1. Thermal energy	2. Melting	3. Evaporation	4. Condensation	5. Freezing

Complete the following sentences:

1. Different	2. Freezing / melting

Choose the correct answer:

1. condensation	2. gain thermal energy and speed up	3. Gas	4. Gas
5. ice	6. melting – evaporation	7. more	



Question 1: Choose the correct answer

1-b	2- d	3-a	4-d	5-a

Question 2: Write the scientific term .

1-Thermometer **2- Expansion** **3- Contraction**

Question 3: Give reason

1- to keep bridges safe from buckling when they expand at high temperature.

2-because when the temperature of the metal lid increases, it expands and can be easily opened.



Question (1): Put (✓) or (×)

1- ×	2- ✓	3- ✓	4- ✓	5- ×

Question (2): Complete The following.

1- Contract - slower **2- decrease - near to**

3- Expand – faster **4- increase - away from**

5-Thermometer

Question (3): Give reason

1- Because when the thermal energy increases the kinetic energy of its molecules increase and the spaces between its molecules increase causing expansion.

2- Because the air inside the balloon contracts by cooling.



Question (1): Choose the correct answer

1- c	2- b	3- d	4- a

Question (2) : Put (✓) or (×)

1- ✓	2- ×	3- ✓	4- ×	5- ✓

Question (3): Give reason

1- To keep bridges safe when they expand at high temperature.

2- To allow these tracks to expand in hot weather without Being bent to avoid train accidents.

Question (4): Write the scientific term

1- Expansion joints 2- Contraction 3- Gas



1-Write the scientific term of the following:

1-Thermal conductor materials. 2-Thermal insulator materials.

3-Plastic

2-Complete the following sentences:

1-faster 2-thermal conductor – thermal insulator

3-kinetic – molecules 4-higher - lower

3-Give reasons for:

1-Because iron is a thermal conductor that allows heat to transfer through it.

2-Because the temperature of the metal spoon is higher than the hand so the heat transfers from the metal spoon to the hand.

1-Put (√) or (x):

1-x 2-x 3-√ 4-x 5-√ 6-√

2-Give reasons for:

1-Because 2 substances reach to the same temperature at thermal equilibrium.

2-Because some of thermal energy transfers to the air or to the container.

3-Because after mixing, the molecules temperature of hotter substance decreases.

3-What happens to ...?

1-The movement of molecules of the hotter substance become slower after mixing.

2-The temperature of a piece of metal will increase.

3-The kinetic energy will increase.

4- Complete the following sentences:

1-faster 2-equals 3-hotter- cooler

5- Choose the correct answer:

1-c 2-d 3-a 4-a 5-b

1-Choose the correct answer:

1-c 2-d 3-a 4-a 5-c

2-Write the scientific term of each of the following:

1-Conduction 2-Convection 3-Radiation
Thermal insulators 5-Meteotologists

3-Cross out the odd word:

1-Friction 2-Plastic

4-Give reasons for:

1-Because they slow down the transfer of heat through them.

2-Because they allow it to travel freely through them.

5-complete the following sentences:

1-conduction- convection- radiation 2-hotter- molecules- down

3-increases 4-bad- good

1-Put (✓) or (x):

1-x 2-✓ 3-x 4-✓ 5- x 6-✓

2-Complete the following sentences:

1-mass 2-equal to

3- plastic – wood 4- solid - liquid- thermal

3-Write the scientific term of each of the following :

1- Thermal energy

2- Law of conservation of mass

4-What happens to ...?

Its mass doesn't change

5-Give reasons for :

1- Because the evaporation of the water during cooking popcorn.

2- Because plastic warms slower than wood.

6-Choose the correct answer :

1- d 2- a 3- d

4- c 5- b

Q.1

1. (×) 2. (×) 3. (×) 4. (×) 5.(√) 6. (×) 7. (×)

Q.2 1. Potential energy. 2. Kinetic energy.

3. Kinetic energy. 4. Thermal energy.

Q.3

1. Because friction force changes kinetic energy into thermal energy.

2. Because the truck has mass more than the small car so the truck gains more kinetic energy.

Q.1

1. light up - clean. 2. iron - sand -water. 3. liquid – solid

4. buildings – bridges 5. chemical - petroleum.

6. sand – limestone 7. tough solid 8. plastic.

Q.2

1. They will light up.

2. Concrete will form.

3. Plastic will form.

4. Glass will form.

5. It becomes hard.

GOOD LUCK!

